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China Report

SCIENCE AND TECHNOLOGY

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CHINA REPORT

SCIENCE AND TECHNOLOGY

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ABSTRACTS

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NATIONAL DEVELOPMENTS

WEST EUROPE EMERGES AS VITAL TECHNOLOGY PARTNER

Beijing CHINA DAILY in English 5 Sep 86 p 1

[Article by Wang Gangyi]

[Text]

Western Europe has emerged as one of China's most important partners in science and technology, according to an official of the State Committee of Science and Technology.

In the past three years, the two sides have launched more than 1,500 co-operative projects, the official said. They involved agriculture, energy, machine building, transport, communications, meteorology, chemicals, electronics, earthquake research, geology, medicine, light industry and other fundamental research projects.

Co-operation in science and technology beween China and Western European countries started in 1978. China has signed governmental co-operation agreements with France, West Germany, Italy, Britain, Ireland, Belgium, Luxembourg, Greece, Spain, Austria, Sweden and Denmark.

An agreement will be signed with Finland when a Finnish delegation visits Beijing later this year, according to the official.

"Western Europe is one of the world's most developed areas in science and technology," the official said. "Co-operation with this area will undoubtedly aid China's modernization drive.

"At the same time, China has its own achievements and advantages in science and technology, from which Western European countries can benefit," he said.

"China regards Western Europe as an important source for technology imports. It hopes to strengthen exchanges with Western Europe and will strive to establish stable and sustained co-operation," he added.

At present, West Germany is China's largest partner among Western European countries. Co-operation between the two has proved fruitful in various fields, the official said.

Next comes France, the first Western nation to establish science and technology links with China at governmental level. During the past three years, an annual average of about 100 projects have been conducted with France.

The official disclosed that China and France were discussing possible joint research and manufacture of satellites for surveying natural resources. They would also hold a symposium on remote sensing in Beijing next month.

The official emphasized that the European Community had been playing an increasingly important role in helping China develop science and technology since co-operation began in 1981.

For example, the EC helped establish seven centres in China that have trained more than 2,000 people in management, planning and energy conservation.

When Jacques Delors, President of the EC's Executive Commission, visited Beijing last July, China and the EC agreed to co-operate in biological engineering, nuclear safety, nuclear fusion and natural gas exploration.

The European Community will help China set up a biological engineering research centre and explore a giant natural gas field.

They are planning an energy project on Dachen Island in Zhejiang Province that will utilize water, wind, tidal, biogas and solar power. It is intended as a model for other areas short of energy.

Discussions on nuclear energy projects are under way.

The official stressed that China's co-operation with Belgium and Sweden has also gone smoothly and fruitfully.

The Belgian Government provided China with four 200-kilowatt wind-powered generators, the largest in the world, while the Swedish Government set up a dairy farm in Beijing that has eased its milk shortage.

/9317
CSO: 4010/2001

NATIONAL DEVELOPMENTS

SINO-GERMAN TECHNICAL TRAINING CENTER ESTABLISHED

Beijing GUOJI SHANGBAO in Chinese 5 Jun 86 p 2

[Article by Gang [0474]: "Sino-German Technical Training Center Established in Tianjin"]

[Text] The governments of China and the Federal Republic of Germany have agreed upon another cooperative project in the area of technical training--the Tianjin Sino-German Modern Industrial Technology Training Center. A few days ago, the foundation stone laying ceremony was held in Tianjin. Responsible officials from the State Council, the Ministry of Foreign Economic Relations and Trade, the Tianjin Municipality People's Government, and representatives from the government of the Federal Republic of Germany laid the foundation stone for the main classroom building of the training center.

In recent years, economic and technical exchanges between China have increased steadily. Tianjin alone has signed agreements for more than 140 technology transfer projects with the Federal Republic of Germany. Mastering these advanced technologies requires a large amount of training, hence the establishment of the Tianjin Sino-German Modern Industrial Technology Training Center.

This institute will occupy a plot of more than 48,000 sq m, which can accommodate a training institute of more than 540 students. It will recruit students nationwide. Practical education will be primary, and theoretical education will be secondary. It will have programs in machine design technology, electronic instrumentation technology, computer applications and software development, and others.

After students complete studies of 2 to 3 years, they will have college-level training and will have mastered the necessary technical knowledge in modern industry to be middle- or high-level technicians.

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CSO: 4008/2119

CHINA JOINS 'WORLD LABORATORY' ESTABLISHED IN GENEVA

Beijing GUANGMING RIBAO in Chinese 14 Jul 86 p 1

[Article by Wang Xianhua [3769 2009 5478]: "'World Laboratory' in Geneva Established"]

[Text] To aid development and cooperation in S&T work in developing countries, CAS and eight other scientific research units from Africa, Europe, and other Asian countries have established a cooperative scientific research organization: "The World Laboratory--International Scientific Culture Center." A meeting marking its establishment was held in Geneva on 12 July.

At the meeting, Italian professor Jixiqi, the head of "Marelana International Center of Science Development," was chosen as chair of the World Laboratory. A constitution was also passed, an executive committee, a board of directors, and a science committee were selected, and a provisional program for 1986 to 1988 was agreed upon.

The World Laboratory is un unofficial organization. The main aim in its constitution is to promote S&T cooperation throughout the world. It will use fellowships, visiting exchanges between member scientists, and other programs to promote the exchange of S&T information and the exchange of S&T personnel. It will expand in particular the scientific research projects that benefit developing countries. The chairman of the meeting pointed out that to promote the development of the Third World, all must share scientific knowledge and technology. The provisional program adopted at the meeting included more than $30 million in funding for more than 10 S&T projects, including agriculture, desertification, earthquakes, pollution control, and disease. Included were Chinese projects concerning the Huanghe conservancy, coal slurry, and biology.

Besides CAS, other contributing founders of the World Laboratory were the following organizations: the Third World Academy of Sciences, the African Academy of Sciences, the [Marelana] International Center of Science Development, the International Center of Theoretical Physics, the International Entomology and Ecology Center, the International Permanent Committee on the Control of Saharan Aridity, the European [Monai] Foundation, the [Jialilue] Foundation, and the Sri Lankan Academy of Basic Research. A number of well-known scientists also participated in the establishment of the World Laboratory, including Professors Li Zhengdao [2621 2398 6670] and Ding Zhaozhong [0002 5128 0022].

Zhou Guangzhao [6550 0342 0664], vice director of CAS, attended the meeting and represented CAS at the signing of the World Laboratory's constitution. Zhou Guangzhao and Professor Li Zhengdao were chosen as members of the science committee. Qian Jiadong [6929 0857 2639], China's ambassador to the United Nations delegation in Geneva, attended the meeting.

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CSO: 4008/2118

NATIONAL DEVELOPMENTS

STATE FUNDING OF APPLIED RESEARCH REDUCED

Beijing GUANGMING RIBAO in Chinese 15 Jul 86 p 1

[Article by Wu Yali [0702 7161 7787]: "This Year China's Funding of Scientific Research To Increase 6.07 Percent"]

[Text] Following the spirit of the Central Committee, the scientific research budgets for 52 units under CAS and the State Council will be centralized beginning 1 July under the administration of the State Science and Technology Commission, following the principles of management by classification.

On the afternoon of 14 July, Zeng Xianlin [2582 2009 2651], the vice director of the State Science and Technology Commission, addressed responsible comrades from the 52 units, announcing the principles of classification this year and the details of implementation.

The important elements in the principles of classification are as follows: state funding for research organizations engaged in technological development will gradually be reduced. This year, the average reduction in funding generally will not exceed 10 percent. The ministry concerned will be allowed to keep two-thirds of the portion that is reduced, and the remaining one-third will be returned in the form of a no-interest loan. The state will still fund scientific research in units that are engaged in projects with social benefits, or in agricultural or basic research. Moreover, funding will be increased annually according to a set rate. Funding in this year's budget was increased 5.5 percent. There has been gradual expansion of a funding system implemented for research units engaged in basic and applied research. This year, 60 to 70 percent of research funds were increased by the 5.5 percent formula. The remainder were reduced 1 to 2 percent, and the portion reduced was returned to the pool of funds.

Zeng Xianlin said that the total amount spent on scientific research increased 6.07 percent over last year.

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NATIONAL DEVELOPMENTS

APPROPRIATE PLACEMENT OF S&T ADVANCES DISCUSSED

Beijing LIAOWANG [OUTLOOK] in Chinese No 21, 26 May 86 p 4

[Text] Some people compare the current reform and S&T progress to the two wings on which China can fly. They say: Flap your wings and have a bright future! There is some truth in this. It is simple: the system reform opens up new frontiers for S&T progress, and S&T has made progress to promote the results of S&T system reform and the speed of modernization will become faster.

This point was clearly proved by the national S&T award meeting held in Beijing in the middle of May. There were 1,761 items of national S&T progress awarded; the economic results of these items had a cumulative total of 110 billion yuan! Most of the S&T items awarded were accomplished after the 3d Plenum of the 11th CPC Central Committee. It is encouraging to have so many important S&T results in a short period of time. The prosperity of Chinese S&T is the forerunner of economic prosperity and the omen of prosperity in China!

The Beijing S&T meeting has passed, but the sound of the S&T forum is still ringing over the 9.6 million sq km of territory. While celebrating the S&T results acquired, the people are preparing for the next step, hoping in the future, especially in the period of the Seventh 5-Year Plan, to have more and important accomplishments.

What conditions does S&T development in China need? According to the current situation, we need these three:

First, insist on putting S&T progress in an important strategic position. On this point, the central authority is clear. In the Seventh 5-Year Plan passed by the National People's Congress recently, one of the outstanding features is the stress on S&T development and building the economic growth of our country on the foundation of S&T progress. The clarity and definiteness of the central decision and policy do not mean that the minds of the leaders of the local party and economic mechanisms in various levels are all clear and definite. Correct theory and logic do not mean they will be carried out thoroughly in practice. Therefore, we have an obligation to publicize the central decision and policy to make everyone, especially comrades in charge of the leadership, understand that in S&T we need results and speed, and they

have an obligation to put the central decision and policy into practice and combine them with the local reality. On this point, in some places, where the leaders have an earlier and better understanding, S&T progress will be faster and the result will be more obvious; in some other places where the leaders have poor understanding, and some do not even have the sense of urgency to strive for S&T progress, progress will surely be slow or is still lip service and has not been put on the agenda. For an example, the investment in basic construction in some places is still expanding, where the production of the original enterprises and the backwardness in technology has never changed; in S&T progress, we need speed, results, and growth which have not caught the attention of the leaders there.

Second, we must create a good environment for S&T progress. The opening-up policy, economic system reform, and the decision about S&T system reform have paved the way for S&T development in our country. The carrying out of the policy and the decision have demonstrated great power that is changing the appearance of our economy and S&T. There is one thing to be strengthened and this is to make great efforts to perfect and develop our S&T markets. This is an important way to combine S&T closely with production, to transfer S&T quickly into direct productivity.

Third, we must give full play to the enthusiasm of S&T personnel. For a long time, under the "leftist" ideology a series of incorrect concepts and methods toward intellectuals took shape; after correction in recent years, the "leftist" ideology has been corrected. However, its influence has never been thoroughly cleared. Comrade Song Jian said well that at present, an important task is "to establish" among the people, especially cadres in various levels, "the concept that our intellectuals are an important component of the working class, and we must, based on this concept, create new working methods." This new working method and new environment are waiting for the various fields to continue to explore and create.

S&T in China are promising and the Chinese people should be proud of them. Under very difficult conditions they acquired results which shocked colleagues of the same trade, and then in realizing the Seventh 5-Year Plan and the grand goal at the end of this century, they will produce more shining results.

According to news reports, China will use a "Long March III" rocket to launch two American communications satellites; with surprise, THE CHICAGO TRIBUNE wrote: "Unwinged American Company Takes China as the Only Hope," which reveals the prosperity of Chinese S&T. The progress of S&T in China is not only for the prosperity of the Chinese economy, and for building the foundation and source for the strong aftereffects of Chinese economic development but also for entering the world to make Chinese culture shine!

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NATIONAL DEVELOPMENTS

COMMENTARY ON PRIVATE RESEARCH INSTITUTES

Beijing GUANGMING RIBAO in Chinese 29 Jun 86 p 1

[Text] In recent years, under the demand of rural economic and S&T development, there has emerged a group of private research institutes owned by the rural enterprises. They are lively and were called the "windows" that understand the markets and the "bases" of S&T development, the "links" to foreign trade, and the "cradle" to cultivate talent.

The rural enterprise-owned private research institute is a new thing that emerged in the reform. Rural enterprises wish to survive and develop and win in the competition, and they must continuously put out new products, modify their techniques, change their equipment which depends on S&T progress, and strengthen their own S&T development and absorption. They urgently need technology and especially advanced technology appropriate for application which the state research institutes are unwilling or do not have time to do. Therefore, rural enterprise private research institutes have become an objective demand. Of course, after demand it still requires possibility. For example, for the 11 rural enterprises in Shazhou County which run research institutes, their annual output is above 10 million yuan and they have a certain backbone technology force; their technical quality is high; and they have wide social ties and have the preliminary conditions of human and material resources. The first is demand and the second is the possibility and this kind of research institute certainly has great vitality.

Can this kind of private research institute be called a research institute? Of course, compared with the big state-owned research institutes in the big cities, these research institutes are insignificant, and their potential in doing research and their equipment cannot compare with those of the former. Nevertheless, their mechanism is flexible, their bearing clear, and they do not "eat from a common pot"; they are eager to innovate and explore, and even if what they do are technological leftovers, they have solved big problems in production and promoted the development of their society and also the growth of rural talent. We believe these rural research institutes which emerged in the reform will grow and mature in their practice along with rural economic development!

Does this kind of research have a future? Yes. In our country, rural areas need S&T, and we have limited S&T power which is specialized for those in the

rural areas. There are more than 1 million rural enterprises and the number is growing while there are less than 10,000 state-owned research institutes which all have their own obligations and cannot meet the S&T demands of society, especially the broad rural area. Based on this, rural research institutes have great vitality; they can play an important role now and be a kind of supplement for the state S&T work and also have a very bright future.

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NATIONAL DEVELOPMENTS

BEIJING NEIGHBORHOOD SEEN AS NATIONAL COMPUTER SERVICES CENTER

Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 23 Jul 86 p 1

[Article: "'Electronics Street' Emerges in Zhongguancun; Business Is Brisk for the More Than 100 New Industrial Companies"]

[Text] More than 100 new industrial companies (centers) have been started in China's high-technology area--Beijing's Haidian District. Many companies (centers) have established retail outlets on the street from Baishiqiao to Zhongguancun. Throughout the year they engage in computer-related business, and offer technical consulting and services. If a unit ever has a computer problem, its staff merely has to walk down this street and they will find a fully satisfactory solution. Therefore, it has acquired a reputation among Chinese and foreign customers as being the "Zhongguancun Electronics Street."

According to official sources, the 16 most important companies (centers) produced a total output last year of 100 million yuan, earning profits of more than 17 million yuan. They also had more than 240 technology transfer and technology development projects.

According to a report published a few days ago in the ZHONGGUO KEJI BAO [CHINA S&T NEWS], all of these companies (centers) were established within the past 2 years. Most were established jointly between enterprises in the Haidian District and CAS, Qinghua University, or other units. There are also some that were established by colleges, universities, or S&T units themselves. They are fairly influential. With their technological and financial resources, they have joined closely with many industrial enterprises to establish several dozen joint organizations, combining technology and economics together.

The Jinghai Computer Technology Development Company already has developed into a comprehensive computer company. This company has established professional contacts with more than 1,800 units in 28 provinces, municipalities, and autonomous districts, and with 19 foreign companies. During the past 2 years, it has worked on more than 200 designs for computer rooms and new R&D research. By the end of last year, it had collected a total of 62 million yuan in revenue, earning profits of 7.2 million yuan.

The Haidian District New Technology Development Center of CAS has developed 88 new technologies, has extended the findings of 100 S&T projects, and has trained 7,000 people.

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NATIONAL DEVELOPMENTS

DEMOCRACY IN TECHNICAL WORK URGED

Beijing GUANGMING RIBAO in Chinese 10 Jun 86 p 2

[Article: "Democracy in Technical Work Urged"]

[Text] Liang Shoupan [2733 1343 2857], member of the CPPCC, in a recent meeting stressed that S&T personnel must strengthen their sense of responsibility. Whether a S&T decision is right or wrong may result in the difference of several million yuan. S&T personnel engaged in design or production must pay attention to this.

Liang thinks that the responsibilities of technical personnel in work are mainly the following:

1. Assessment of the feasibility of a project or its approach. For any piece of S&T work, after the target is set, the person in charge of technology should compare and prove all the methods possible; in the assessment he should not start with the concern of his own small circle to choose ways beneficial to themselves to take advantage of the situation to gain interest, nor in any case when the authorities already have the tendency to do something, may he pander to the authorities without paying attention to the reality. For problems which are not quite understood yet, certain experimental work should be arranged to be able to understand as soon as possible and ensure that the arrangement is able to stand the trial of time.

2. Democratic technology. Modern engineering is broad and comprehensive and cannot be handled exclusively by one or two people; various kinds of people should be invited to give their opinions. However, after the leadership has decided the case, the people should work accordingly with no one going his own way. In some situations, specialists tend to "improve constantly" and hope to have their specialty realized in the product; however, in view of the overall situation, better effects may not be necessary. What is more important is to ensure a certain kind of standard in quality and raise the percentage of passing, lower the initial cost, and increase the amount of output. Blindly pursuing the high goal of a certain discipline is often the source of waste.

3. Conditions and progress. In the choice of a project, one must start with the reality and cannot start with "the foreigners do so and so." Work

progress should be on the foundation available. In some work in the past, some people thought to grab the work first and then present the request to the leadership. Obviously this kind of approach is irresponsible.

4. Budget. For the items which cannot obtain a return within a certain period of time, it should be considered in the assessment whether they should be put into the present plan. They should not be taken as "foreign construction" and end up wasted.

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NATIONAL DEVELOPMENTS

SHANGHAI AIDED BY TECHNOLOGY IMPORTS

Beijing CHINA DAILY in English 22 Sep 86 p 2

[Text]

Imported technological products have upgraded hundreds of enterprises in Shanghai, China's largest industrial city, a city official said.

Between March 1983 and June of this year, the city signed contracts for a total of 894 technological import items from foreign firms. At least 90 per cent are up to the international standards of 1980s, he said.

Some 330 of these items are now being used in production, upgrading a dozen trade areas including metallurgy, foodstuffs, home-use electrical appliances, ball bearing production and printing.

By introducing 168 advanced technology items to revamp 21 production lines, the annual output of colour TV sets increased 100 times from 1980 to 1985. The quality is now up to advanced international standards, he added.

To speed up the technological advances, since 1985 the city has chosen 520 major products to be key development items. Through the import of key equipment, cooperation among different trades and co-designing with foreign firms, the quality of 334 major products has met or surpassed advanced international standard by the end of last year.

In another development, Shanghai has rearranged its industrial mix to produce more sophisticated products, according to Yu Pingfang, director of the municipal economic committee.

Production of garments, knitted polyester fiber materials, radio and candies has been reduced while that of bicycles, sewing machines, colour television sets, cassette recorders, washing machines, refrigerators and stainless steel tableware has risen by a big margin to meet the market needs this year.

According to the director, 75 industrial enterprises and workshops which produce coarse and low-grade products, are to be closed down or merged with other businesses to make room for production of noted-brand and export-oriented commodities.

Yu said new techniques of microelectronics, biological engineering, optical fiber telecommunications, lasers and ocean engineering are being used in Shanghai, and industrial enterprises are equipped with more than 10,000 microcomputers.

To solve its raw materials problem, Shanghai has set up 170 production bases for raw materials and primary processing in the Shanghai Economic and Technical Development Zone, and other provinces and cities through economic cooperation.

(Xinhua)

/9317
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NATIONAL DEVELOPMENTS

TECHNOLOGY IMPORT PRIORITIES FOR BEIJING LISTED

Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 14 Jul 86 p 3

[Text] Question: What are the top priorities for overseas Chinese from Hong Kong, Macao, Taiwan, and elsewhere who come to Beijing Municipality to invest and open new factories?

Answer: Beijing Municipality has set the following items as key projects for near-term use of foreign investment in technology imports, based upon the special characteristics of Beijing and the needs of modernization: 1) Electronics industry. Modern office equipment and optical communications technology. Computerized teaching and computer equipment for scientific research. VLSI production. Microcomputers and software applied to the management of modern urban industries, transport, and tourism. 2) Food industry. Health foods. Special wheat flour and vegetable fats. Bean, milk, and egg products. Nourishing foods for infants. Flavorings. Food additives. 3) Textiles and dying industries. Products made with synthetic silks and wools. Knit goods. Decorative cloth. Technology for post-dye handling. 4. Household goods industry. Kitchen utensils. Makeup. Cleaning supplies. Eyeglasses. Writing implements. 5) Precision instruments, meters, and printing industries. Electronic balances. Atomic absorption spectrometers. Mass spectrometers. Electronic color scanner. Offset presses. Automated instruments for controlling industrial processes. Electronic medical instruments. 6) Construction machinery industry. Lightweight wall materials. Decorative surface materials. All kinds of plastics. Materials for interior installation. Bathroom fixtures. Cellulose boards. Construction metals and processed manufacture of aluminum materials. 7) Energy industries. Development of geothermal, solar, botanical, and other new energy sources. 8) Development of satellite cities and towns. Construction of tourist facilities. Production of tourist souvenirs. 9) Selection and raising of various kinds of vegetables, fruits, livestock, and other high-quality goods in agriculture, forestry, animal husbandry, and sideline industries. Increased processing of agricultural and sideline products.

Anyone who is interested in the above items can contact the Beijing branch of the China International Trade Promotion Committee.

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NATIONAL DEVELOPMENTS

NEW DEPARTMENT FOCUSES ON TECHNICAL EXPORTS

Beijing CHINA DAILY [BUSINESS WEEKLY] in English 10 Sep 86 p 1

[Article by Ma Lixin]

[Text] China is introducing a great amount of foreign technology, but it is also trying to export some of its own.

A new department under the China Scientific Instruments and Materials Corporation was set up in May in Beijing to facilitate technical exports. New regulations will soon be issued to guide the export programme.

The newly established Technical Export Department is now working on about 50 export items with business companies from about 10 countries.

"Two or three projects should be finalized by the end of this year," said Zhou Jiemin, aged 51, the department manager.

He said "foreign businessmen have shown great interest in China's medicine, food, beverage and individual items of industrial technology."

The importers are mainly from the United States, Britain, France, Switzerland and Yugoslavia.

China's technical exports began to emerge only recently.

In the past three decades when China's door was closed to the outside world, China only exported around 30 technical items valued at $20 million.

And another important factor hindering technical transfer was the absence of a Chinese patent law, not adopted until 1985.

"For some time, new inventions were transferred free of charge. The situation was not conducive to initiative because technology innovators enjoyed no patent protection," Zhou said.

The China Scientific Instruments and Materials Corporation has participated in exhibitions in Britain, Switzerland, Yugoslavia, the United States and Japan, displaying more than 200 export items. The company is now preparing

for the coming Guangzhou Autumn Commodities Fair and an international new technology exhibition in Brussels in November.

"China is not well-prepared for large scale technical exports," Zhou Jiemin said. "Sellers do not have proper introduction materials for their products and they need foreign currency to apply for international patents."

The world's pure technology trade amounts to $50 billion a year, with Japan, the US and West Germany in the lead. India is also gaining ground in world technical markets.

Though a latecomer, China's technical exports have aroused worldwide attention. To seize the initiative, the Ministry of Foreign Economic Relations and Trade and the State Scientific and Technological Commission are now working on new laws and regulations that will include:

--Emphasis on manufacturing technology. As long as exported technology. As long as exported technology does not jeopardize national security or political and economic interests, they must be encouraged.

--Preferential treatment of technical exporters in taxes and allowances. The government will set up foreign currency funds to boost overseas technical sales.

--Centralized management. The State Scientific and Technological Commission and the Ministry of Foreign Economic Relations and Trade will be responsible for technical and export appraisal.

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NATIONAL DEVELOPMENTS

SUCCESS OF S&T PERSONNEL NOTED

Beijing GUANGMING RIBAO in Chinese 8 Jun 86 p 1

[Article: "S&T Personnel Succeed During Sixth 5-Year Plan"]

[Text] With the effort of more than 3,500 S&T personnel, in the period of the "Sixth 5-Year Plan," the National S&T Commission acquired a batch of important results in basic key research with the publication of 6,800 academic theses in certain academic levels and the acquisition of 238 items of S&T results, among which are many new discoveries. Some of the results, after their application in industry and agriculture, have acquired economic results of 100 million RMB.

In this S&T army, there are many famous scientists of our country, such as Wu Zhonghua, Chen Huakui, Xie Xide, Gou Kexin, Wang Jiading, Gou Qingquan, Xiao Jimei, etc.; their areas of research involve mathematics, physics, chemistry, mechanics, biology, mechanical engineering, and erosion and environmental protection. They broke the barriers of discipline and of department and closely cooperated with one another to make the most of the whole.

Among the results of basic research, most of the items have certain applications, such as the AB03, a rare earth catalyst developed by the Changchun Institute of Applied Chemistry (CAS) and used for ammonia oxidation in the manufacture of nitric acid, which makes it possible for the first time in the world to make nitric acid without platinum; this catalyst is comparable to platinum in performance but the cost is one-tenth that of platinum catalyst. The research on "pulse conduit flow and conduit vibration control" done by Xi'an Jiatong University was applied in two factories with an increase of 13 million RMB a year in profit. Lanzhou University did research on Chinese angelica and [snow lotus], extracted 104 different kinds of substances, among which is a partially oil-soluble new Chinese angelica fat and wide-spectrum antibiotics are compounds found for the first time in the world, and the [sesquiterlactoglucoside] and the [sesquiterlactoglucoside element] found in the snow lotus are also compounds found for the first time in the world. Their discovery increased the value of Chinese angelica and snow lotus in their application.

Among the 6,000 papers published, some of them have reached a higher level in theory. Professor Xiao Jimei of the Beijing Iron and Steel Institute and others, in a paper "Study on the Stress Corrosion of Metal and Fractures Resulting in Hydrogenation," put forward for the first time the new branch discipline of "fracture chemistry," which has become one of the three pillars in the theory of fracture study after "fracture physics" and "fracture chemistry," forming a new school of our own country which is acknowledged by international colleagues.

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NATIONAL DEVELOPMENTS

TIANJIN S&T PERSONNEL DEMONSTRATE PROFICIENCY

Beijing GUANGMING RIBAO in Chinese 1 Jun 86 p 1

[Article: "Tianjin S&T Personnel Participate in Technology Markets"]

[Text] The Center of Tianjin Municipal Industry and Technology Development (formerly the Service Center of Tianjin National Defense S&T and Industrial S&T Development) has led their S&T personnel from the "underground" activities of evasively engaging in technical consultation, technology transfers, and technical services into just and forceful engagement in "open" activities in the technology markets. The center has now become a spare-time development group which has 520 S&T personnel (covering 7 percent of the total S&T personnel in the municipal national defense S&T system); 370 items were accomplished last year, worth 350,000 RMB, and 81,000 RMB in taxes were submitted.

There have been different opinions on whether technical personnel should engage in spare-time activities in S&T development. Under various kinds of pressure, technical personnel who wanted to do part-time S&T development had the desire but dared not put it into practice, thus creating an abnormal situation of a legal activity which no one dared to do in public. This development center believed that the "Preliminary Regulations for Transfer of S&T Results" published by the State Council last year provided important policy bases for these activities. Spontaneous spare-time development must be guided with both support and restraint to reduce the negative influences and to bring into full play the initiative of the S&T personnel to create greater wealth for the society. Thus they established the "engineers' spare-time service" to be in charge of the work of organization and management.

All the 500 engineers joined the service voluntarily through application, investigation, enlistment, and grouping. Every group is organized voluntarily with no restriction on the number of people or disciplines. A liaison man is chosen by the members of the group to pass on information, and they meet once every season to coordinate the activities and study the measures to be taken, issue news, and exchange information.

The center formulated a series of regulations to ensure the normal development of spare-time activities in S&T development, which stipulate clearly that their activities are limited only to S&T development, consultation, and

service and should not be engaged in commerce or in labor. They also stipulate concrete measures to handle disputes about the ownership of knowledge, unexpected happenings, and the inability to deal with the relationship between one's own work and spare-time work.

Items undertaken by an individual, whether offered by an engineer himself or assigned by the center, once affirmed after the feasibility study, should be represented by the center, which will sign the contract with the client to be followed by both parties. The payment due to the individual shall be paid through the center according to the stipulation, and the individual shall not have any direct dealings about money with his client; the center shall take all the risks. The center also established a set of measures about financial management. They stipulate clearly that, under the premise of completion without any mistake in the spare-time work, according to the principle that "income belongs to the individual," the individual shares 75 percent of the net income (including the share of the individual S&T personnel, the share of the related people as a group, and the share to be submitted to the department for the use of information, equipment, and material), that 10 percent shall be for a management fee, and that the other 15 percent shall be used to pay taxes and the members' welfare expenses.

The major ideological block that affects the initiative of the S&T personnel to do further development is their worry about policy changes. They worry that their legal income today may become an economic crime and that they may make mistakes and end up accused of tax evasion. In order to eliminate these lingering psychological fears and provide better guarantees for S&T personnel, the center negotiated with the Tianjin Municipal Tax Department and agreed that a 10 percent temporary commercial tax shall be imposed on the income of spare-time S&T personnel. The income, after taxation, shall belong to the individual and is legal. Thus the worry will be dispersed.

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NATIONAL DEVELOPMENTS

S&T PERSONNEL SENT TO FACTORIES AS TECHNICAL ADVISERS

Beijing RENMIN RIBAO OVERSEAS EDITION in Chinese 1 Aug 86 p 4

[Article by Wu Fei [0839 7378] and Wu Shan [0702 1472]: "CAS Shanghai Institutes Export Knowledge, S&T Personnel Follow Research Findings, 'Marry' Enterprises, Serve as Advisors"]

[Text] In recent years, 15 CAS institutes in Shanghai have dispatched more than 600 S&T personnel to serve as advisors in factories and enterprises. This is to help speed the extension of scientific research findings and the expansion of production. This flow of knowledge has been warmly welcomed by production departments.

The majority of S&T personnel in this group are middle-level researchers. There are also some high-level researchers. Many comrades are dispatched to factories and enterprises when institutes release scientific research findings. In the past, some production units had difficulty quickly putting the findings into production because they lacked the technical capability. Now S&T personnel follow the research findings and temporarily are "married" to these units, quickly solving technical problems and insuring that the findings are applied in production. This has clearly resulted in economic and social benefits. After the Shanghai Silicate Research Institute successfully produced eyeglasses that change colors, it extended the results to two colored glass factories in Anhui's Fengyang County and Jiangsu's Haimen County. At first, product quality was not satisfactorily consistent because of the technical limitations of the factories. Later, this institute sent S&T personnel to serve as technical advisors to these two factories, working jointly with factory technicians to solve production problems. They also improved production problems. They also improved production management so product quality was raised quickly. In 1985, these two factories produced 2.5 million pairs of variable-color eyeglasses. Product quality reached the advanced standards of similar foreign products. The value of annual output was more than 10 million yuan, and more than 5 million yuan was turned over to the state in taxes and profits.

Many S&T personnel also help factories and enterprises solve other technical problems encountered in production, helping expand production. One factory in Jiangsu's Wu County spent $170,000 to import a vacuum coating machine. After more than 10 months of debugging after installation, the machine still did not

operate properly. This seriously hurt production. After Zhang Rusong [1728 1172 2646], an engineer at the Shanghai Metallurgical Institute of CAS, was sent to this factory to serve as a technical advisor, he led the factory technical staff and repaired the machine in only 15 days. After it was put into production, the value of annual output reached 400,000 yuan.

When the institutes sent S&T personnel out to serve as technical advisors to production units, there is absolutely no relaxation in the institute's scientific research. Many S&T personnel who serve as technical advisors manage to find time to successfully carry out research at the same time. Last year, the Shanghai Metallurgical Institute of CAS dispatched 115 staff members to serve as technical advisors. This was one-fourth of the total S&T staff, and in recent years was the largest number dispatched in 1 year. However, last year this institute obtained 48 important scientific research findings, which also in recent years is the most in 1 year. Among the findings were some that approached or equaled advanced international standards.

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NATIONAL DEVELOPMENTS

YOUNG S&T PERSONNEL ASK FOR GREATER SUPPORT

Beijing GUANGMING RIBAO in Chinese 10 Jul 86 p 2

[Article originally published in GONGCHENGSHI LUNTAN [ENGINEER'S FORUM]: "Young S&T Personnel Hope to Solve Four Problems"]

[Text] At present, what problems do young S&T personnel have in applications and in studies that desperately need solution? The Science Association of Shanghai Municipality and the Municipal Youth League Committee jointly conducted a sample survey of more than 3,000 young S&T personnel. The following problems emerged as the most prominent:

1. Too much emphasis on seniority. This leads to insufficient attention paid to the work. When leaders in certain units make work arrangements and assign research tasks, they rarely think of young persons, so the talents of young S&T personnel are not fully utilized. Some young S&T personnel at a certain research unit searched for projects to do because their work responsibilities were too light. They proposed a project to their leaders that was needed and also was certain to be successful. The leaders, however, did not accept the proposal and told them that they were too young and filled with grandiose ideas. A young instructor at a university revealed that young faculty members are promoted slowly and find it difficult to advance. They do not have the support of professors or famous individuals. It is very difficult to make a breakthrough. A young doctor revealed that senior, middle-aged, and younger staff are ranked by seniority for even such things as issuance of library cards or permission to attend conversational English classes, let alone for such things as job titles, promotions, housing, and bonuses. There were 1,351 respondents who mentioned this problem, or 45 percent of the total.

2. Specialized capabilities are under-utilized because of workloads. There were 580 respondents who mentioned this problem, or 19 percent of the total. After some young S&T personnel assume leadership posts, they must spend their entire day attending meetings and handling trivial matters. And there are also some young S&T personnel who hold too many posts. For example, a young university instructor simultaneously also serves as Youth League committee secretary and assistant dean of instruction. A young S&T person at a particular factory also serves as environmental protection representative and another position, totalling three. These personnel rarely have time to work in their own fields.

3. Specialized expertise is under-utilized. There were 480 respondents who mentioned this problem, or 16 percent of the total. Supply and demand are not matched when graduates are given their work assignments. Moreover, some units pay insufficient attention to work assignments, resulting in the waste of human talents. There was a graduate of a textile engineering institute with a major in electronic automation who was assigned in 1982 to a factory. "Every day I do calculations, copy forms, assemble statistics, and do exhausting inspections and supervise repairs. None of it bears any relation to my specialty." These people hope to work in an appropriate occupation and hope to be mobile. Some have already found a unit that will accept them but because human talent belongs to organizations, leaders in their original units refuse to release them.

4. More than 200 respondents, or 6.7 percent, said that their leaders were unsupportive of study. One young person, who had originally studied chemical engineering machinery was actually working in architectural design. For his work, he spent 60 yuan in tuition to attend after work a class in architectural structural design at an architectural institute. When he asked his unit to help contribute toward the tuition, a leader told him, "You are a college graduate. You don't need to keep studying. Let's keep the tuition money for those who haven't yet been to school." Some young S&T personnel would like to take a computer class and learn about the new technology, but their leadership and work responsibilities are too heavy and they do not secure permission. Young S&T personnel ask, how can they do a good job if their leaders only use them and do not offer professional development.

The above examples drawn from the survey show that young S&T personnel hope to put their talents to full use. Leaders at all levels should fully and warmly support them, willingly use them, and create the necessary conditions for their early maturation.

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NATIONAL DEVELOPMENTS

SHANGHAI JIAOTONG UNIVERSITY REFORM SUCCESSFUL

Beijing GUANGMING RIBAO in Chinese 9 Jun 86 p 1

[Article: "Shanghai Jiaotong University Successful in Reform"]

[Text] Shanghai Jiaotong University has passed its 90th year. At its 90th-anniversary celebration held at Shanghai Jiaotong University, Yang Haibo, deputy director of the National Education Commission, ebulliently praised the university's obvious results in its reform. He said that reform in management and teaching, which promotes teaching and S&T research to face production to serve the economic construction, has created a new situation for the development of the university. Jiaotong University's reform has been affirmed by the comrades in charge in the central government and has created a fine influence in the schools and universities of higher education in the nation.

Deng Xuchu, director of the celebration commission, at the beginning of the celebration reviewed the glorious history of Jiaotong University. He said that the important contribution of the university to the nation lies in its adherence to the principles of pursuing true knowledge, doing practical work, and working hard, its tradition of high entrance standards, its solid foundation, and its strict requirements in running the university which has been developed over a long period of time; the university has nurtured a great number of outstanding scientists and social activists for the country. Deng then gave a brief description about overall system reform in the university which emphasized the system of management in the past 7 years and the success achieved.

Finally Deng said the fact that Jiaotong University had passed through unforeseen events and had risen again reveals a school that, after its foundation and strength had been weakened, could still jump up suddenly into the ranks of the advanced. If there is any secret in it, it must be the road of reform and the achievement of victory through reform.

Jiang Zimin, mayor of Shanghai, also addressed the meeting. He hoped that the new teachers, students, and staff of Shanghai Jiaotong University will insist on and perfect reform to make contributions for the construction of higher education with Chinese characteristics, to do better service for the four modernizations and reform, and to promote Shanghai.

Comrades Wu Lanfu and Lu Dingyi and others signed autographs for the 90th anniversary.

Among the 20,000 in attendance for the celebration, there were also comrades in charge from the departments of the central government and the State Council, comrades in charge from Hebei, Shaanxi, Fujian, Guizhou, Jiangxi, and Shanghai municipalities, representatives of the college and universities, and alumni and well-known people from Japan, the United States, England, and West Germany.

The unveiling ceremony was also held at the statues of Sheng Xuanhuai, founder of the Nanyang Public School, predecessor of Jiaotong University, and the university's president, Tang Wenzhi, an important contributor to the university's development.

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NATIONAL DEVELOPMENTS

XI'AN JIAOTONG UNIVERSITY AS KEY S&T BASE

Beijing GUANGMING RIBAO in Chinese 5 Jun 86 p 1

[Article: "Xi'an Jiaotong University Becomes Key Northwest S&T Training Base"]

[Text] More than 20,000 teachers, students, staff, and workers gathered together this morning to celebrate the 90th anniversary of this school of higher education and the 30th anniversary of its move to Xi'an. He Dongchang [0149 2639 2490], vice chairman of the National Academic Degree Committee, praised highly the contributions of the university in the construction of the great Northwest in the past 30 years since its move.

Founded in 1896, Jiaotong University, following the decision of the State Council, moved westward. Several hundred aged, middle-aged, and young professors resolutely gave up their comfortable lives in Shanghai to settle down in the great Northwest. In the past 30 years they have cultivated 50,000 people in various disciplines; acquiring more than 730 items of important S&T results, the school developed rapidly and has become an important base for teaching and S&T research in the Northwest.

In the past 30 years, Xi'an Jiaotong University was never unworthy of the trust of the masses in the Northwest and has silently done much work in the construction of the Northwest. It has sent 18,000 undergraduates and graduates to the Northwest region and also specially trained for the provinces in this region more than 23,000 cadres, teachers, and technicians. Among them, 900 belonged to national minorities. The leader of the university has five times led groups to investigate the economic development and demand for qualified personnel in the Northwest and to provide systematically, through the establishment of disciplines, training classes, and technical services for provincial construction. According to statistics, in recent years, the university has established cooperative ties in technology with more than 200 local enterprises with 400 cooperative items.

Vice Chairman He Dongchang and the secretary of the Shaanxi provincial party committee, Bai Jinian [4101 4764 1628], attended the celebration and addressed the audience. He pointed out that in the future, the emphasis of national construction will gradually turn to the Northwest, and at the end of this century, the students at the university now will become the backbone

in the construction of the Northwest. Thus to do a good job in running the university and educational affairs in this region has become more important and we hope that the comrades at this university may contribute more to greeting this historic mission of ours.

Among those attending were also Teng Teng [3326 5671], deputy director of the Central Propaganda Department; Shu Tong [5289 0681], commissioner of the advisory commission; and 100 overseas alumni and foreign guests. Lu Dingyi [7120 1353 0001], chairman of Jiaotong University board of directors, mailed a written statement for the occasion.

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NATIONAL DEVELOPMENTS

S&T WORK IN SHANGHAI, HENAN DISCUSSED

Shanghai S&T Worker Encouraged

Beijing GUANGMING RIBAO in Chinese 6 Jun 86 p 1

[Article: "Shanghai S&T Worker Encouraged To Work Spare-Time Job"]

[Text] Wang Daoming, an engineer from the Shanghai Broadcast Equipment Plant, was criticized by the disciplinary unit of the plant, through a circular issued in March, for his using spare time to do technological services and transfers of the results of his own research, and his party member registration was postponed as an administrative punishment. On 27 May of this year, Wang Daoming was warmly met by the related leading cadres from the Shanghai Municipality CPC Commission for Discipline Inspection and was told that his engaging in spare-time technological development is right and that they hoped that he could continue. The next day, a party meeting was held at the organization where Wang belongs, and Wang's party member registration was adopted unanimously.

Early in 1985, Wang sold to Huajia Electrics, Jiading County, the converter production technique, a key component for portable fluorescent lamps, which he designed and developed with another worker in their spare time; this newly established township enterprise adopted this practical technique, which requires little investment but has quick results and which made a profit after the first month of production. During the 6 months before production, Wang gave up his weekends and holidays to train technicians in that factory, design the production line, and install and adjust instruments; he worked very hard yet did not even take a single cent. After the factory made a profit, they decided to give him 120 yuan for remuneration. In the fall of 1985, the supply of converters fell short of demand, and in the name of his future son-in-law, he signed a technology transfer agreement with another factory and received 800 yuan for the technology transfer and after paying taxes, he got 438 yuan.

In January of this year, the CPC Shanghai Broadcast Equipment Plant Organization for Inspecting Discipline called Wang and criticized his taking jobs without the approval of the party. He immediately stopped receiving pay for his spare-time job and took the initiative to return the 480 yuan to Jiahua Electrics. In March of this year, the Shanghai Broadcast Equipment

Plant Organization for Inspecting Discipline issued the "Circular on Comrade Wang's Mistake," which said: "Comrade Wang Daoming made serious mistakes" and "was poor in party spirit, had a poor sense of organization, took a job without permission from the party, and extorted a 'technology transfer fee' in another's name." The decision was that "the improper income of the 1206.40 yuan, which was received by Wang Daoming against regulations, should be returned and given to the authorities," and it instituted the administrative punishment of postponing his party member registration.

Later, investigations were conducted by the related departments of the municipal science association, which thought that Wang had outstanding performance in his work in his department and that his engaging in spare-time work was legal as long as he fulfilled his duty in his ordinary work without encroaching on the techniques and economic interests of the department. There is only one act which is a bit inappropriate: his use of his future son-in-law's name for the technology transfer. The municipal science association deems that this kind of S&T personnel should be cherished and encouraged to play a better role.

The situations and opinions reflected by the municipal science association caught the attention of the municipal party commission. Under the concern of the leadership of the municipal party commission, Wang's problem was solved smoothly.

Enterprise Cooperation Encouraged

Beijing GUANGMING RIBAO in Chinese 6 Jun 86 p 1

[Text] Based on the decision of the central government on the reform of the economy, S&T, and the education systems and the spirit of the "Regulations of the State Council About Problems in the Further Promotion of Horizontal Economic Cooperation," to give full play to the superiority of CAS and the universities in S&T and to promote cooperation between S&T research units and large and medium-size enterprises, the State Economic Commission, the State Education Commission, and CAS together recently issued a "Circular on the Promotion of Cooperation Between Large and Medium-Size Enterprises and CAS and the Universities."

The "circular" requests that prefectural party committees and economic committees (planning and economic committees), higher education bureaus, and branch institutes of CAS put the cooperation between the large and medium-size enterprises and the institutes of CAS and the universities on their agenda, in order to have a clear understanding about the situation and formulate concrete measures to help guide large and medium-size enterprises to rely further on S&T to spur S&T troops outside of industry to have a better chance in facing economic construction.

The "circular" points out that cooperation between large and medium-size industries and enterprises and the institutes of CAS must stick to the principle of voluntary and mutual benefit, taking from the long to add to the short, in various forms and mutual development. Cooperation at various

levels and in various forms should be launched in the various aspects such as the digestion and absorption of the transferred technology, technological development, technological innovation, talent cultivation, and modernization of enterprise management, centered on the development of new products, an increase in product quality, a reduction of cost, growth in economic results, and foreign exchange creation. Special emphasis should be given to the development of new technologies and results on the more effective utilization of energy and material and on putting these into practice.

The State Economic Commission, the State Education Commission, and CAS decided in 1986 to establish cooperation among 100 large and medium-size industries and enterprises and S&T institutes and to draw up the cooperation plan on 100 important S&T items. Items in the plan shall be supported according to related regulations.

The "circular" hopes that the economic committees in Beijing, Shanghai, Tianjin, Shenyang, Harbin, Xi'an, Wuhan, Chengtu, Lanzhou, and Guangzhou will take the initiative to contact the local institutions of CAS and local universities to start dialogues and visit each other. The departments, bureaus, and companies under the State Council, in addition to their enthusiastic promoting of the cooperation between production research units and the large and medium-size enterprises, should also organize professional and specialized visits and dialogues including the S&T units of the CAS and the universities. The institutions of CAS and the universities should take the initiative to visit the local economic committees and the industrial departments of the State Council to express their willingness in mutual visits and dialogue.

The "circular" finally said to strengthen macroscopically the coordination and guidance in cooperation among large and medium-size enterprises and institutes of CAS and the universities, the State Economic Commission, the State Education Commission, and CAS have negotiated and decided to establish an "economic S&T cooperation coordination team."

Henan Province Work in Technology

Beijing GUANGMING RIBAO in Chinese 6 Jun 86 p 1

[Text] The Henan Province people's government decided recently to appoint one deputy governor to lead in organizing and coordinating the various departments to help the people in the Dabieshan mountain region to become rich.

The province, in the spending of funds, puts together the relief funds from the civil administrative department, capital from the economic department, development funds from the S&T department, and credit loans from the bank to help the people there to introduce technology and the talented to do research in "short, level, and speedy" development items. Since the beginning of the year, 13 items in the "spark plan" have been arranged for the people in the Jiangsu Province Dabieshan district, with an investment of 700,000 yuan and a loan of 1.4 million yuan. In personnel deployment, a contingent of 1,000

people, mainly S&T personnel, shall be organized to be stationed in Dabieshan to help the mountain people formulate development plans, promote S&T application, and improve management. In addition, they should organize the large and medium-size factories in the industrialized cities to help the people in the mountain region. Seventeen factories and mines in Zhengzhou have established mutual assistance with Xin County in the Dabieshan mountain district with more than 100 items of support to help train more than 130 S&T personnel. In personnel training, the provincial S&T commission decided to establish a personnel training center in Xinyang, to use the technological force in the universities in the province to train urgently needed specialists for the region, and 350 trainees may be admitted each year.

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NATIONAL DEVELOPMENTS

TECHNOLOGY MARKETING GROUP AIMS TO BOOST ECONOMY

Beijing CHINA DAILY in English 7 Oct 86 p 1

[Article by Xu Yuanchao]

[Text]

A national technology marketing group of 48 companies and government institutions was formally inaugurated in a Beijing ceremony yesterday, its aim to apply scientific findings to industrial and agricultural production in order to boost the economy.

The establishment of the China Technology Development Group is vital to the country's economic reform and to reforms in the scientific and technical field, said Song Jian, State Councillor and Minister of the State Science and Technology Commission, at the ceremony.

The group will co-operate with financial organizations to invest in new technology development and aid the technology market. It will help develop science and technology in backward areas and transfer applicable technology to enterprises in rural areas.

Whether China's economic and scientific — technical reforms can succeed depends mostly on the availability of technology, Song said, adding that channels to bring high technology and scientific findings into the market are too few.

"Some of the scientific findings in China can be comparable to those in the industrialized countries, but we lack the technical ability to do research. That is why the State Council calls for links between enterprises to bring their technical advantages into full play," Song said.

It is important to transfer technology to less-developed areas, Song added, saying, "People in poor regions live on subsidies from the State every year but they don't know how to develop and make use of their rich natural resources to make themselves better off."

Guo Shuyan, Vice-Minister of the State Science and Technology Commission, said that development of a technology market is an integral part of a socialist commodity economy from which the nation's economic construction can gain impetus.

But the development of such a market is not "clear sailing," he said. In the first half of this year, the value of technology transactions declined by a large margin compared with the same period last year.

This is because some business leaders insisted that it was proper for research institutes to transfer technology to enterprises at no cost.

Some institutes also paid little attention to whether their scientific findings could be applied to production.

China is short of people who know not only science and technology but also economics and management. At the same time, scientists' talents have not been brought into full play, Guo said.

He said that further opening of the technology market is a "great breakthrough" that will generate enthusiasm among scientists and researchers to involve themselves directly in the country's economic construction. And it will pave the way for reforms in other fields.

Last year, the value of domestic technology trade totalled 2.3 billion yuan ($621 million). One-third of the incomes of research institutes came from links between those institutes and enterprises, said Lin Zeren, Director of the China Technology Market Development Centre.

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NATIONAL DEVELOPMENTS

TECHNOLOGY MARKETS SPRING UP IN JIANGXI

Beijing GUANGMING RIBAO in Chinese 12 Jun 86 p 1

[Article: "Advanced Technology Markets Spring Up in Jiangxi Countryside"]

[Text] Jiangxi Province, in its development of technology markets, stresses drawing a clear line of demarcation in the policy and encouraging exploration and the S&T personnel to take spare-time jobs. Thus will emerge a batch of technology markets of obvious profit. Twenty-three technology markets in various counties and townships were praised and given awards in the provincial technology market conference recently.

The rural technology market in Jiangxi started in 1984; up to the first half of 1985 there were 45 technology markets established in different counties and districts. The rise of the technology markets facilitates the transformation of technology into productivity and promotes the growth of the economy of rural commodities. However, owing to the ambiguity of the policy in demarcation, some technology markets engaged in producing a small number of commodities unrelated to technology transfers; some S&T personnel were afraid of making "the mistake of being a businessman" and suspected the future of the technology markets and dared not to continue their spare-time work. To cope with this situation, the provincial technology committee called S&T market symposiums in Jian Municipality and Yu Shan County, organized and studied the decisions from the central government on S&T system reform, and insisted on the policy of "opening up, vitalizing, supporting, and guiding the technology market." In policy, the stress is to draw the three clear lines: the first is to draw the line between technological commodities and general commodities, the second is to draw the line between developing technology markets and enterprises run by the party and political authorities, and the third is to draw the line between the reasonable remuneration acquired through S&T services permitted according to the policy and the unhealthy tendency of bribing or taking bribes. The Jiujiang Municipality, Xunyang District, S&T commission supported and protected S&T personnel doing spare-time work, publicized the related policies, and enabled them to apply happily their new technology in economic construction. The Fengxin County S&T commission appointed 32 S&T personnel as S&T consultants to the technology markets to encourage them to do spare-time jobs to serve the S&T markets. Last year, one technological personnel used his spare time to teach peasants to plant monkey peaches, and at the end of that year the technology market of that county paid him, according to the contract, 480 yuan.

When the demarcation and direction of a policy are clear, the enthusiasm of the S&T personnel is high, and the technology markets will be lively. Up to now, 87 of 98 counties and districts have established technology markets. In 1985, S&T trade activities at different levels and in multi-channels and various forms occurred, such as organizing technology service teams, using "country fairs" to establish stands, S&T service offices doing S&T consultation, establishing bases for demonstration, running paid S&T classes, establishing new tech-production organizations, exchanging specialists and technology fairs, etc. There were 40,690 items of S&T done in the year.

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NATIONAL DEVELOPMENTS

DESIGN INSTITUTE ECONOMIC RESPONSIBILITY SYSTEM DISCUSSED

Beijing GUANGMING RIBAO in Chinese 15 Jun 86 p 1

[Text] A tall, oval-shaped, and dark brown glass-coated tall hotel building was chosen for the design of the U.S. and China joint venture hotel. This is the eighth large architecture design done by the Seventh Design and Research Institute, Ministry of Astronautics, that won the bid. Cao Zuen [2580 4371 1869], director of the institute, told the reporter excitedly that without economic and S&T system reform, there would be no Seventh Institute today. Abolishing operating expenses and implementing the technology and economic responsibility system were just like opening a long-closed sluice gate to give unprecedented free rein to the creativity of the S&T personnel.

The Seventh Design and Research Institute was established to meet the demand of national defense engineering construction in 1965. In the 20 years since then, the institute has been living on an annual operating budget of about 1 million yuan. The director said that owing to the limitation of operating expenses, they did not in the past accept any design outside the directive plan and as a result many talented designers asked to leave because they could not be used as designers.

In 1984, under the support from the ministry's party committee, it was decided to abolish the operating expense system and implement the technology economic responsibility system, and they insisted on the principle of more work, and more pay to connect the income of the worker directly with the target accomplished in output, quality, and percentage of fulfillment of contract and profit.

This reform greatly aroused the enthusiasm and the creativity of the intellectuals; under the condition of finishing 100 percent of the internal work, the engineering design power of that institute went rapidly to the society, and they accepted a great number of architectural designs from 25 provinces and municipalities.

Pressure became power; to survive and grow among competition, their working efficiency greatly increased. Some designs which took half of a year in the past can now be done in less than 2 months. To win the bidding, they used their brains and blazed a new road of high quality, high standards, and high profit, paying attention to creating new models and improving service. In

the designs in recent years, three items won the national design awards. Since 1984 there has been more and more work, but their fulfillment of the contracts is always 100 percent, with guarantees in quality and quantity, and they acquired a good reputation in the fields of architecture and construction.

The director told the reporter: "In the past, intellectuals were afraid of being in the limelight (young shoots); whoever was in the limelight would be pinched off. Now a young shoot is a signboard. If our institute wishes to become famous, we must have several famous outstanding designers. Thus the young shoots emerged in response to the needs of the times." Senior engineer Zhang Jinkui [1728 6855 1145] of that institute is one of the young shoots who popped up during the reform, whose design is both new and unique and won a prize and bid. His design of the 30-story spindle-shaped textile building was well received by architects.

Now the leadership and the masses are all saying: "Young shoots are the life blood of our institute, and we must make a great effort to cultivate and protect them."

Owing to the implementation of the system reform, the economic income of that institute has been growing. In 1983, its property was valued at only 4 million yuan; after the reform in 1984 it increased to 7 million yuan, and by 1985 it again increased to 11,390,000 yuan, with a profit of about 4 million yuan within 2 years. In the past, it had to ask for 1.8 million yuan for operating expenses from the state, and now it not only does not ask but also submitted 1.47 million yuan to the state in 1985.

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NATIONAL DEVELOPMENTS

INVENTORS BENEFIT FROM PATENT BOOM

Beijing CHINA DAILY in English 11 Aug 86 p 2

[Article by Tian Ying]

[Text]

China has taken a major step forward in implementing its first patent law as the country's organization in this sphere develops steadily.

The Patent Office has had more than 24,000 applications, of which about 11,000 are foreign, since it opened in April last year.

Applications from European countries top the list this year with 981, followed by Japan, 924 and the United States, 820.

Last year the number of applications from Europe ranked second, next to Japan.

"The increasing number from Europe shows that our patent law now enjoys higher prestige abroad," said Huang Kunyi, director general of the office.

Applications from abroad cover various fields, including the chemical industry, electronics, oil exploration, and farm and food machinery.

The office has received about 7,120 applications this year from organizations and individuals in China. Spare-time inventions account for 73 per cent, the director told China Daily.

Spare-time inventions refer to those made in out-of-work time using funds and materials provided not by the State but by inventors.

Most of these applications are from individuals. Many have been put into practical use.

Some factories and organizations in the past considered employees who were keen on inventions to be day-dreamers. Their proposals were often neglected. Some inventors were even punished on the grounds of having ignored their duties.

"But now the patent office can examine and introduce their inventions to society," the director said. "The patent law has encouraged inventors' initiative. Both patentees and industry have benefitted."

Liu Zhongdu, a member of the Beijing Science and Technology Development Corporation, has received patents on several inventions.

A device he devised which is highly sensitive to dust, temperature and humidity, won a prize last year at an international fair in Geneva.

It has been installed in several factories and laboratories in China.

A new invention, a musical instrument that can play automatically following dancers' steps, will be completed soon, Huang said.

Huang told China Daily that of the 9,411 applications the office received last year, only about 20 per cent were from factories and mines and this trend was continuing.

He complained the country's industries had not devoted themselves sufficiently to technical development. Some had not realized the importance of patent rights.

For instance a factory in Changzhou City, Jiangsu Province, profited last year by turning out a newly-designed chair. But orders declined dramatically this year because six other factories in the city started producing the same thing.

"Our work emphasis in the latter half of the year will be placed on promoting the patent law and helping industries train patent workers," Huang said.

A patent service network has been formed in China.

Apart from the head office in Beijing, there is a branch office in Shanghai and five agencies in the cities of Changsha, Shenyang, Nanjing, Jinan and Chengdu.

About 240 offices have been established by local governments. At the moment there are about 7,000 patent agents across the country.

Huang told China Daily a national conference on patent work would be held in October.

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NATIONAL DEVELOPMENTS

PATENT LAW AIDS TECHNICAL INNOVATION

Beijing CHINA DAILY in English 30 Sep 86 p 1

[Article by Wang Gangyi]

[Text]

The implementation of China's Patent Law, brought in on April 1 last year, is promoting both innovative development and technical exchanges with other countries, according to the Patent Office.

"By the end of last August, the office had received 25,785 applications, of which 13,879 were inventions, 10,818 utility models and 1,088 designs," said Huang Kunyi, general-director of the office.

Sixty-eight per cent of the applications are domestic and 32 per cent are from foreign countries.

Applications from the United States totalled 1,036 from January to August this year, surpassing those from Japan which reached 916 in the same period. But Japan still leads the foreign applicants with a total of 6,445.

Huang said that by the end of last month, his offices had published 5,202 and granted 1,193 patent applications.

One of the main purpose of the office's work is to help speed up the transfer of technology into productivity.

According to Huang, patents technology had become an active and indispensable part of the business of technology transfer.

More than 80 factories have recently decided to pool their funds and production capacity to jointly produce a cylinder washing-machine after its inventor was granted four patents by Huang's office.

The patented production technology for an energy-saving silencer for automobiles has been transfered to several manufacturers. The device has been proved so efficient that the municiple government of Yantai, a coastal city in Shandong Province, has decided that it should be installed on all city-registered vehicles.

The general-director told China Daily that his office was redoubling its efforts to boost patent work in the country's enterprises, to strengthen information processing capability and to build up a more efficient patent taskforce.

As part of the three-pronged bid, the office was to hold a national working conference in early November, during which delegates would work out measures to encourage patent applications from enterprises.

According to the office's statistics, at present only 13 per cent of the domestic patent applications are from industrial enterprises. And the situation was even worse last year, when the country's factories only handed in 1,126 applications, 12 per cent of the domestic total.

This situation contrasts sharply with that in industrialized nations where applications from enterprises usually amount to about 70 to 80 per cent of the total.

The lack of interest among enterprises in patent applications, according to Huang, is partly because of poor promoting work on the part of his office and partly because of the failure on the part of factory managers to realize the importance of patent work.

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NATIONAL DEVELOPMENTS

CHINA SPEEDS UP DRAFTING OF NEW COPYRIGHT LAW

Beijing CHINA DAILY in English 11 Sep 86 p 1

[Article by Nie Lisheng]

[Text]

The State Copyright Administration has proposed a draft of a national copyright law requiring copyright protection of literary, artistic and scientific works by foreign as well as Chinese authors for their lifetimes and 50 years after their deaths.

The proposed draft, which may become China's first copyright law since 1949, was revealed yesterday in Beijing at a seminar on the need for copyright legislation to encourage intellectual creation and promote cultural and scientific exchanges between China and foreign countries.

"China is speeding up the drafting of a national copyright law and hopes to publish it within five years," said Li Qi, a senior administration official. "After publication, it will join international copyright organizations as soon as possible when other conditions are also ripe."

On Tuesday, China sent a delegation and a message of congratulations to the World Intellectual Property Organization (WIPO) to mark the 100th aniversary of the Berne Convention, saying the convention had made outstanding contributions to the development of world literature and arts by safeguarding the legitimate interests of authors and artists of various countries.

According to the proposed Chinese copyright law, its citizens shall enjoy protection of their works, whether published or not and no matter where they are published.

Foreigners will have copyright protection for works first published inside or outside China, as well as unpublished works, in line with any agreement between China and the country of which the foreigner is a national, or with the international copyright convention to which they may both be attached.

The law will include literary, oral, musical, dramatic and choreographic works, fine art, photography, cinema, and illustrations, maps, plans and models relating to geography, topography, architecture or science.

The proposed draft version defines the following copyrights to be enjoyed by authors:

The moral right (1) to make the work public through all legal means; (2) to have their names signed or not on their work; (3) to claim authorship; (4) to protect the integrity of their work; (5) to revise their published work; and (6) to make a statement to withdraw their published work.

Authors will also have the economic right to utilize their work by means of publication, reproduction, recording, performance, broadcasting, exhibition, translation, adaptation or scripting, and to be paid for the use of his work by others, unless otherwise stated by law.

The term of validity of the economic rights shall be the life of the author and 50 years after his death, calculated from December 31 of the year of the author's death.

But renumeration may not be paid in cases where excerpts, reproduction or translation of a published work of another person are used only for personal study and research or when published works are used in newspapers, broadcasts, television programmes and newsreels for the purpose of reporting current events.

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NATIONAL DEVELOPMENTS

RELIABILITY RESEARCH SEEN AS KEY FOR MACHINE INDUSTRY

Beijing CHINA DAILY (BUSINESS WEEKLY) in English 3 Sep 86 p 1

[Article by He Qingquan]

[Text]

Last year China spent $17.6 billion on imports of machinery, 43 per cent of the country's total imports. But the figure could be reduced by one third.

The key to reduction is reliability research, a science still very new to the Chinese.

"This research could well lead to a turning point in our machinery industry," said Pan Zhaoqing, an engineer with the Ministry of Machinery Industry.

According to Pan, reliability means that a product must fulfill its prescribed functions under prescribed conditions for the longest possible time. It constitutes a significant aspect of a product's quality, along with excellent performance.

A major concept in reliability research is mean-time of fault (MTF) which means the time between its first use and the first major fault.

Chief objective

"Our chief objective is to prolong MTF and reduce the possibility of faults," Pan said.

The engineer described a high-level of reliability as a must for good marketing of such products as machinery and electronic equipment.

He said that one major reason Chinese-made machinery received a cool reception at home and abroad was low reliability.

"Our products cannot win buyers' trust because they break down too easily, and there is a shortage of repair shops," he said.

If China's machinery industry gave sufficient emphasis to reliability, it could not only replace large volumes of imported machinery with domestically manufactured ones, but it could also step up machinery exports.

Pan said the electronics industry's stress on reliability had resulted in it gaining steady ground at home and abroad selling Chinese television sets and other electronic products.

Special officials

Realizing the importance of such research, the Ministry of Machinery Industry has designated special officials to take charge of the programme, which will set standards for manufacturers. Pan is one of those responsible officials.

Beginning last year, the ministry stipulated reliability standards for 20 types of mechanical apparatus

such as transformers and regulators. It is now drafting more to cover all mechanical products.

Two training classes have opened in Beijing and Qinhuangdao to familiarize 150 factory directors and government officials with reliability theory.

The ministry plans to train 1,000 experts and officials by the end of this year.

"Because most of our technicians and business people don't even know about the research, our first job is to train our own personnel," Pan said.

The ministry has appealed to some universities to open courses and set up departments to conduct reliability research.

New science

This science is only several years old in China, pioneered by the ministries of electronics industry and ordnance industry.

A research institute of several hundred people has been set up in Guangzhou, Guangdong Province, affiliated to the electronics industry.

Pan said that sooner or later all industrial ministries will come to realize the importance of reliability testing and standards.

According to Pan, some senior Chinese officials, uninformed about this new science, have placed little value on its development.

Pan said that his ministry's efforts to obtain research funds from the State Planning Commission and the Ministry of Finance have been in vain because officials there do not understand its importance.

"We don't even have funds to conduct the most basic experiments," Pan said.

Pan said reliability research began in 1968 with the Apollo space programme in the United States.

"It is now emphasized in all developed countries," he said.

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NATIONAL DEVELOPMENTS

ACADEMY OF SCIENCES DEVELOPMENT OF BIOLOGICAL SCIENCES VIEWED

Beijing KEYAN GUANLI [MANAGEMENT OF SCIENTIFIC RESEARCH] in Chinese No 2, Apr 86 pp 1-6, 10

[Article by Song Zhenneng [1345 2182 5174] Department of Biological Sciences, Chinese Academy of Sciences]

[Text] I. The Status of Biological Research at the Chinese Academy of Sciences

After 36 years of development since the establishment of the Republic, the biological research department of the Chinese Academy of Sciences [CAS] has become the center of multi-disciplined biological research in the nation. It has made significant contributions to our country in the building up of socialism and the development of biological sciences.

(1) Within the last 36 years, the biological research organizations of the CAS have single-handedly, or working jointly with universities and local governments, completed several thousand important scientific projects. About 900 of these projects have won awards from the nation, the CAS, and local technological organizations. For example, in the areas of national economic construction and services, the study of rubber forestry in southern China has provided important data regarding optimum plantation, especially the extension of plantation areas to the north. Based on long-term survey of the Changjiang river fish resources, suggestions to stop the construction of fish passage channels at the Gezhou Dam water project has saved the construction costs by 50 million yuan. Regarding the flying locust damage prevention research in East Asia, some new methods have been developed and implemented. These methods have effectively controlled locust damage in several eastern provinces which had long histories of locust problems. The successful development of two-step fermentation to produce vitamin C was the first of its kind of technology in the world that allowed the mass production of the vitamin. The method has been popularized within our country and has become a new and advanced technology which is being exported. Based on the white wine industry's statistics in 1982, the successful cultivation of bacteria capable of fermenting large quantities of glucose and starch and its popularization have reduced the nation's grain consumption by 400 million tons, resulting with economic gains of 80 million yuan. Other

important contributions to the nation's agriculture, forestry, medicine, and industry are: coordinated surveys made at places like Qing-Zang highlands, Northsouth mountains ridges, Heilongjiang, Xinjiang, etc.; soil alkalinity correction and improvement in northern and north-east China, Xinjiang, etc.; the increase of agricultural products through research in carbon granule and rare-elements fertilizers; selection and cultivation of flowering plants with great agricultural and economical values; detoxication of potato stem tips for degeneration prevention; selection, cultivation and utilization of fresh and sea water algae and fishes; domestication and cultivation of castor silkworms; survey, forcast and control of certain insect infestations; wastes treatments at Ya-er Lake and some industrial factories; survey, development, analysis, and utilization of life resources of various types; and early detection and cure of liver cancer. Regarding basic research, the successful synthesis of insulin earmarked our country as the first one in the world completing the synthesis of protein in the laboratory. The success of laboratory synthesis of alanine transfer--RNA has made us competible with other more advanced countries in macromolecular synthesis. On "Brain and Brain Structure Micro Amount Injection of Morphine for Pain Suppression Studies," the results have been hailed by foreign scientists as the milestone for research on the effects of the functions of body by morphine. In addition, work related to areas such as the discovery of the photosynthetic phosphorylating hyperenergy state; the structure and function of certain proteins and enzymes; DNA sequencing; nucleus transplantation; proliferation and differentiation of embryos; transportation through nuclear membrane and osmosis; life history of seaweeds; function of acupuncture on pain control; discoveries of certain toxin and bacteria; research in the development and classification of biological systems, etc, have all achieved results compatible with the international standards. Under the sponsorship of the CAS, we have organized the nation's researchers and scientists, and have edited and published many volumes of "Chinese Botany Review," "Chinese Zoological Review," "Chinese Economic Zoology Review," "Chinese Economic Entomology Review," and "China Vegetation," "China Pedology," and atlases of vegetations and soils,...etc.

(2) We have already formed a biological science team with respectable size and quality. Up to now, the CAS has a scientific and research personnel of 5,900. Among them, 640 are assistant researchers, and senior engineers. We also have quite a few senior scientists who are well-known nationally and internationally. They have contributed greatly in leadership, participation of scientific research, training personnel, and initiation of new projects. It is nice to know that many more middle-aged and young technical personnel are emerging with the latest knowledge and skills and are becoming the frontline in doing scientific research today.

(3) The various branches of biological sciences of the CAS have been reorganized and combined. The existing basic research areas such as taxonomy, morphology, physiology, and so forth, have been expanded continuously both in breadth and depth. At the same time, attention is paid on applying new theories, new concepts, new technologies and new methodologies to stimulate the growth and development of scientific work. Most importantly, some of the advanced new areas, such as biotechology, molecular biology, cell biology, neurology, and ecological systems, have been given special help and reinforcement. This has built a good foundation for future advancement.

(4) In order to act decisively in accordance to our country's open door policy, we have greatly increased the international cooperation and information exchange activities related to biological sciences. Based on some incomplete statistics from 1978 to the present, there are nearly 1,000 members of the CAS participating in cooperative research and/or pursuing advanced studies abroad in biological sciences as visiting professors, visiting scholars, graduate students, or students taking advanced courses. Many of them have been very successful in conducting scientific research while either abroad or after returning to this country. Some of them have even made creative contributions. Activities such as international scientific technology corporation, exchanging visits, attending technical conferences and exchanging books, literature, specimens and seeds have been continuously increasing. Up to now, the biological research organizations of the CAS has established scientific cooperation and exchange with many countries of the world.

(5) We have most of the supporting organizations and experimental materials needed to develop the Institute of Biology, including instrumentations, experimental drugs and chemicals, experimental animals, as well as installations such as farms, fish tanks, interim factories, green houses, refrigeration storage rooms, vacuum experimental chambers, and artificial weather simulation rooms, etc. Although we are far from satisfied with what we have because many problems have to be solved for further improvements, our general conditions are much better than at the early period when the country was just liberated.

(6) The committee members of the biological science department of the CAS are our nation's outstanding scientists selected from the fields of biology, agriculture, forestry, and medicine. They function as a group with high scholastical authority, and have contributed significantly to the tasks of planning, organizing, judging, directing, and consulting to advance our nation's, especially the CAS biological research.

Our accomplishments over the past 30 years are very significant. Although the future tasks will be more glorious, they will also be more difficult. Presently we are facing a whole new situation. Our nation's scientific and technological activities, including research in biological sciences, are facing new challenges because of the central government's decisions related to the change and improvement of the scientific research system. Our work, however, still cannot meet the nation's needs. Internationally, biological sciences are advancing at an extremely fast speed, especially the revolution in the field of biotechnology. Due to various reasons, the level of biological sciences in our country is still some distance away from that reached by the more advanced countries. However, the biotechnological capabilities of some universities, as well as some national and local research organizations have been improved significantly and many important results have been achieved. They have also provided us with suggestions in improving cooperation with other similar level organizations. Under this new situation, the problems of how to decide the developmental strategies of the biological research in the CAS, how to better utilize its functions, and so forth, are awaiting to be fully discussed and answered. In the following section, I would like to present my personal points of view.

II. Views for the developmental policies of Biological Sciences of the CAS:

(1) Give priority to the development of biotechnology.

Because biotechnology has great significance and important influence on the scientific and technological revolution, special attention has been focused on these areas. In our country, the main disciplines of biotechnology were first commenced by the biological sciences related Institutes of the CAS. We have already obtained good results through practical work, and the results of some of the biotechnological research have been social and economical gains. At present, there are approximately 700 people engaged in biotechnology research in our country, and 100 of them have done joint research and studies abroad. Having this great manpower and technological background, it is the honorable responsibility of the CAS to give priority to the research and development of biotechnology so that it can withstand the challenge of the biotechnology revolution in the world and make significant contributions to the four modernizations. In the development of biotechnology, I believe the following viewpoints should be stressed:

1. While giving special attention to genetic engineering, the development of cellular, enzymatic, and microbiological engineering should also be emphasized. At the present time, getting new products through the use of genetic engineering is still at a primitive stage. However, because of its fundamental importance in biotechnology and due to the great promise it holds in the future, we should specially emphasize the development of genetic engineering technology. Besides research and development of genetic engineering on procaryotic cells, special attention should be henceforth be given to the research and development of eucaryotic cells as well. There is a close relationship between the development and research of genetic engineering and that of the cellular, enzymatic and microbial engineering. These research are not only important by themselves, they can also benefit the social and economic development in a relatively short time. Therefore, measurable support should be given to the researchers in these areas.

2. Besides implementing certain projects which can be developed and have practical value, projects that may have important influence on our economic construction should also be formulated as well. The CAS has already achieved good results in biotechnological research during the "sixth 5-Year Plan" period. Examples are: the cultivation and rapid reproduction of many plants that have economic value; the production of monoclone antibodies for diagnostic use; the discovery and effective utilization of bacteria with different properties such as producing certain enzymes that can benefit the processing of food and agricultural industries, producing large quantity of seven different kinds of amino acids, and vaccine production through genetic engineering technology. If we can take advantage of these experimental results, promoting, enhancing, and converting them into practical use at a faster speed, they can have direct effects on our national development in the "Seventh 5-Year Plan". Meanwhile, we should take advantage of the multidisciplined and coordinated nature of the CAS and study certain subjects which may have important economic meaning and broad applications such as quantitative cultivation of plant and animal cells; hybridomas; amino

acid sequencing; antibiotic production through genetic engineering, etc. Breakthroughs in these areas should have important and far reaching influence in advancing the four modernizations policies.

3. We should rapidly improve and strengthen the weak links. There are two weak links in our country's biotechnology. First is technology and certain key techniques, and the second is basic research. Transferring research findings to products is but empty talk if weak links of technology and techniques can not be strengthened (e.g., bioconductors, biosensors, post-treatment techniques of biotechnology products, etc.). The key to the strengthening of these weak links depends on recruiting and educating able personnel. Exerting great efforts to seek a close coordination between biological research workers and specialists in the areas of chemical engineering, chemistry, electronics, computers, and mechanical engineering should be our urgent task. As a whole, the research and development of our country's biotechnology show more "imitations" than "creations." This is closely related to the serious backward nature of our basic research. It would be difficult for biotechnology to maintain its continuous development and gain major break through if sufficient basic research is lacking. Therefore, based on the conditions and the specialties of the related Institutes of the CAS, a complete plan for conducting the important basic research in biotechnology should be devised. We should strengthen research in areas such as gene splicing, indentification, analysis, synthesis, and control; cell differentiation; mechanics of emzymatic and cellular reactions; metabolism and control of micro-organisms, etc. A time table should be set and good work must be performed.

There are gaps in various areas of biotechnology between our country and the more advanced countries. We should make the best use of the favorable opportunities of our country's open door policy by taking various measures such as attracting new technologies and personnel and learning and acquiring everything abroad which is good and useful to us. Meanwhile, we should also be aware that foreign countries will keep their latest high technology tight secrets. Therefore, we whould rely on our own strength to realize our aims. Our goal is to establish gradually more complete biotechnology system in the CAS, a system which is multidisciplined with the capabilities of conducting developmental, applied, and basic research. We should work hard and use the next 10 to 20 years' time in reaching the technological level similar to that of the more advanced countries and also make due contributions to new products through biotechnology.

(2) Economic construction shuld be considered as an important strategic duty.

In order to meet the urgent need for increasing our national production capability, it is important for our biological research department of the CAS to play a major role in the economic construction programs. The question is how to select and decide our policies. Our advantage is good cooperation among different branches of biological sciences, supported by natural sciences and technological sciences. We also have a fairly large group of qualified technical personnel. They can play leading roles in absorbing new concepts and new techniques from abroad. They can also create

and develop new ideas in certain areas of biological sciences. Our disadvantages are that we are weak, or completely lacking in the applied areas of agriculture, forestry, medical and pharmacuetical sciences. Also, there is neither consistent testing and application system from central to local governments nor subsidiary equipment. Based on the above analysis, in accordance with the principle of drawing on the strong points to make up for the weak, we should emphasize "coordination," "expertise," and "modernization". We should also work together with other departments and local organizations in order to avoid duplications. In doing so, the CAS can play a key role in solving many major and complex problems in our nation's economic construction program. Based on this analysis, the policies I believe, should be:

1. To organize multidisciplined and coordinated studies for developing, utilizing, and managing the land and water surrounding the territory of our country. Past experiences have proven that through manifesting the advantage of the multidisciplined nature of the CAS and organizing joint investigation teams with other related units, we have provided important scientific information and recommendations for certain projects, such as selecting suitable locations for planting rubber trees in southern China, developing and utilizing the Yunnan shellac lac insect, and developing the wastelands in northeast China. As a result, we received praises from the units we helped. Based on the need of our country's construction programs, it is important for us to organize continually such joint investigation teams to conduct certain meaningful studies such as the effect of Changjiang River engineering constructions to the ecology of its environment; the development and utilization of the resources of the highlands in southeast China etc. However, it should be pointed out that although we are able to make certain valuable contributions to the joint projects in studying the management of our country's lands and river regions, it is the duty of the various responsible production departments and universities to conduct such studies, because they possess the major scientific technological powers related to the applied sciences in agriculture, forestry, and water. If we do not cooperate with them, and if we involve ourselves with projects which do not match the expertise of the CAS, the results will be unproductive.

2. We should proceed with the investigation and research of bio-resources, ecology, ecology engineering and environmental protection. The CAS not only has the expertise but also the manpower to do research in these areas. We should concentrate our efforts on certain important projects such as resources development; protection and investigation of some medically important plants; investigation and cultivation of microorganisms which can survive under extreme conditions; environmental protection of land and basins; enhancement of pastures, forests, lakes and rivers; organizing and promoting the cooperation among the experts; providing useful information directly applicable to production, and providing models and organizing demonstrations.

3. We should investigate the innovative ways, techniques, and methods to solve production problems. We stressed the word "innovation" in the past, and through it we had provided assistance in solving problems during the

national building up period. For example, new methods for asexual reproduction were developed, new means were found to prevent insect damage through the use of bacteria toxins and insect sexual gland secretion. New measurements were also instituted in preventing diseases of live stock and promoting their rapid growth by the use of animal and insect hormones. In addition, new techniques of artificial spawning for increasing domestic fish production and new methods for early liver cancer detection were also worked out. In the days to come, we should continue to search for new methods in solving problems related to agriculture, industry, public health, and environmental protection In the past, most innovations were from abroad and very few were our own creations. Of course, it is important that we should continually use the new techniques and new methods developed abroad and expand on them, because they can help solve some short-term production problems. However, relying on the intelligence and wisdom of our country's biological personnel to be creative and productive should be an important goal for us to strive for.

(3) Gradually strengthen basic research and strive to raise basic research standards.

The decisions of the Central Government on changing and improving the scientific research systems have clearly given the responsibilities for the development of basic research to the universities and the CAS. Many people have begun to recognize the importance of doing basic research. It has been proven through many years of experience that providing basic research with a stable working environment, maintaining appropriate basic research distribution ratios in the technological development programs and preventing sudden changes will help greatly in promoting the development of technology and the improvement of our nation's economy. In recent years, after reshaping the scientific research programs, the appropriate ratio of basic biological research (including applied basic research) to total technological research being conducted in the CAS has almost been achieved. As for the future, it is important to further enhance basic research due to the demands from the four modernizations policies, the production units and local biotechnology teams, and the position the CAS represents in the military. However, presently it is most important to continue to improve the quality and the standard of basic research. In this respect, we should know how to train high quality scientific personnel better, how to enhance their creativity and provide an environment that encourages free discussion and critique among the colleagues, how to select the best people to work together as a team, and rid the problems of "small and divisive" currently existing in the conduction of basic research.

The CAS plays a leading role in many areas of basic biological research in our country. However we are still behind in comparison with the international standards, although in some limited areas we are closely matched or even ahead of the international standards. Based on our country's situation, we should choose to work in some of the most significant and leading areas of the biological sciences and obtain achievements that far exceed the international standards. Also, we should try to catch up on some weak areas rapidly and thus gradually reducing the gap in the level of

biological research between our country and the more advanced countries. We want to achieve these goals within the next 10 to 20 years.

In addition, the policies for developing biological sciences should be "emphasizing key points and paying attention to all areas." After gathering various opinions from members of the CAS and other related scientists, the standing committee of the biological science department of the CAS has completed a plan for developing biological sciences for the "Sixth 5-Year Plan" period. According to this plan, areas with priority for development are: molecular biology, cell biology, neurology, and ecology. Meanwhile, research in other areas of biology should also be developed. The above plan is also suitable for directing the development of biological sciences for the "Seventh 5-Year Plan" period to the "Eighth 5-Year Plan" period. It should specially be mentioned that the taxonomy of zoology, botany and microbiology are the foundations of biological sciences, and are important in the investigation, development, utilization and protection of bio-resources. However, these areas are in a "dangerous" situation due to the shortage of interested research personnel and budget restrictions. Special attention should be taken to save these areas from further decline. Today, the CAS is still weak in some important areas of research such as molecular neurology, molecular immunology, human genetics, applied ecology, etc. These areas need to be expanded and improved immediately.

On the planning of basic research, we should choose some important and meaningful directions, concentrating the effort and making breakthroughs. Some possible directions are:

1. Projecting the forefront of biological sciences, selecting and working on certain areas with potential to grow and to exceed worldwide standards.

These areas include the structures and functions of macromolecules; the relationships between proteins and nucleic acids; genes, particularly the eucaryotic genes; the control and expression of genes; cell differentions; hormones and receptors for neurotransmitters; the structures and functions of ecosystems.

2. Applied basic-research related to the national economy.

Among the basic research the CAS conducts, applied basic research should bear more weight in the years to come. Some of the important projects, for example, are: improving the quality of seedlings and agricultural products through gene research; studying and solving problems associated with disease resistance in microorganisms, insects and plants; cancer prevention; malignant cells transformation, differentiation and control; birth control, etc.

3. Important theoretical discussions and map preparations for biological and soil sciences.

First, we have to concentrate our efforts in editing the national magazines, "Sporophytes," "Botany," "Zoology," "Vegetation Maps," "Soil Atlas," etc. Based on the accumulation of a large number of specimens and literature and the use of systematic and in-depth methods of research, we should explore important theoretical problems such as the systematic development, origin and evolution of bio-species, etc.

III. Some Essential Problems in Carrying Out the Strategy:

(1) Setting the strategy of development upon a firm foundation.

As developmental strategies have been discussed and approved, it is necessary to make plans and arrangements in order to carry them out. For example, deciding what kind of important theoretical research; which research organizations, laboratories and testing grounds should be given supoprt and attention so they may become the strong hold in solving problems related to the economy and production, and thus may either bridge the gaps between research and production or become internationally known research centers or both. We should also know which weak areas should be strengthened, where the foundations should be built, and how to manage the relationships among different research organizations and with what kind of arrangements, etc. Meanwhile, we have to be sure that the developmental strategy can be carried out systematically as planned.

(2) Promoting cooperation and coordination inside as well as outside of the CAS.

It is necessary to encourage competition. However, in the environment of socialism, it is more important to promote cooperation and coordination among various organizations and disciplines. This will help greatly in solving important problems related to the national economy, providing communication between research and production, developing multi-disciplined courses, and speeding up personnel circulation. Presently there are many problems existing in these areas. The leaders at various levels should pay close attention to these problems and try to solve them with policies, financing, management and political idealism. As for the CAS, we should aggresively promote cooperation among different disciplines within the CAS and strengthen cooperation with related institutes, departments, and local research organizations. We should strive to change the CAS from isolation to openess with flexibility, encourage coordinated research, establish joint laboratories and research departments, encourage job exchanges, and research-production combined sponsorship, etc.

Regarding problems associated with cooperation, we have to promote good citzenship, put the benefit of our country above everything else, and avoid isolation, jealousy and fame seeking. We should be willing to play the "supporting" roles and work diligently on the task assigned to us by the host unit. For the tasks that we are in charge, we should treat those assigned to us warmly as brothers, respect them, and give them the credit they deserve.

(3) Select, groom, and train young and middle-aged technical personnel.

It is important to continue to take advantage of the abilities of the seasoned senior scientists. However, the duties of promoting technology, advancing the four modernizations and working to surpass the international technology level have been bestowed upon the shoulder of the young and middle-aged scientists. Discovering, promoting, attracting, grooming and

training the top middle-aged and young scientists will be the key to the completion of these duties. Based on the sayings of Comrade Deng Xiaoping "talk less, work more," we should provide them with better working and living conditions and give them the opportunities to learn and to do advanced studies. Although the CAS has worked toward this direction in recent years, there is still a lot more to be done. We should boldly remove the obstacles that may prevent the advancement of promising young people. We should also encourage more middle-aged, particularly young people to participate in international conferences. Furthermore, we should create environments that may attract top quality post graduates, college graduates, and nationally and internationally known scientists to work for the CAS.

(4) Establish and strengthen interim testing system and improve experimental conditions.

The interim testing system in biological sciences of the CAS is weak. The lack of technical personnel, particularly high quality specialists in the weak and untapped areas has become the stumbling block in transferring research achievements into products quickly. We cannot and also should not build interim testing systems in every area. However, it is absolutely essential to build this system in some important areas and make it available for use by other units. For example, we should build a limited number of interim testing factories and storage house for cultivating special cells and plant tissues, constructing refrigeration warehouses to keep fruits and vegetables fresh etc. These are the questions that need to be considered at the conference meetings. As for the fermentation interim testing factories and warehouses, the key problem at present is to seek and add qualified individuals. Furthermore, for better biological research, it is necessary to construct and improve the bacterial cell line preservation centers, gene and cell banks and seed banks.

In regards to the application of new technology and experimental conditions, besides efficiently utilizing computers and remote controls in biological research and purchasing needed instrumentations, the urgent need for the present time is the guaranteed supply of experimental animals, biochemicals and isotopes. Improving and strengthening the experimental animal centers and biochemical factories is also urgently needed for conducting research. We hope that group leaders with the responsibilities at various levels will work together diligently to solve these problems.

We are on the verge of a biotechnology revolution. In our country and abroad, not only the biologists, but the mathematicians, physicists, chemists, and scientific technologists have also recognized the increasing role biological sciences play in the whole of natural sciences and technologies. The CAS has laid a good foundation for biological research. With the correct and proper execution of our strategies, with every member of the CAS and fellow scientists in other related areas striving together, and with the support of responsible leaders at various levels, the biological research at the CAS will contribute greatly to our nation's four modernizations drive.

13048/12948
CSO: 4008/1073

NATIONAL DEVELOPMENTS

BRIEFS

TECHNOLOGY GROUP--Tianjin has set up its first new technology development group together with firms in Beijing and Jiangsu Province. This is one of the latest moves taken by this leading industrial and port city in north China to broaden its economic ties with other parts of the country, officials said. The 40 members of the Tianjin New Technology Development Group will work together to design and develop new projects, run joint ventures using new technology and spearhead the use of new technology and equipment. The group has decided to start some 90 co-operation projects. Firms of the United States, Britain, Japan, Singapore, Canda, West Germany and France will participate in 26 of these. [Text] [Beijing CHINA DAILY (BUSINESS WEEKLY) in English 10 Sep 86 p 1] /9317

CSO: 4010/2001

APPLIED SCIENCES

KEY PART FOR ELECTRON-POSITRON COLLIDER DEVELOPED

OW071309 Beijing XINHUA in English 0859 GMT 7 Oct 86

[Text] Beijing, 7 Oct (XINHUA)--China has worked out a key part of its electron-positron collider, one of the state's key projects, the ECONOMICS DAILY reported today.

The "70B storage ring bending magnet" which is made up of 42 8-ton blocks of magnetic iron, the most sophisticated of the 300 blocks required by the collider, has been developed by the Shanghai Peioneer Electronic Motor Factory, the paper said.

The electron-positron collider is used in high energy physics and is primarily used in the study of charged particles and the relationships between groups of charged particles. The collider's two main functions are to conduct basic high energy research, and work out synchrotonic radiation values.

After testing, Dr Wu Chien-hsiung, member of the U.S. National Academy of Sciences and her husband Yuan Chia-liu, senior researcher of the Brookhaven National Laboratory of the United States, rated the blocks better than those made in the United States, the paper said.

Speaking highly of the achievement, the party's general secretary Hu Yaobang was quoted as saying, "I salute those comrades who have made this sophisticated technical advance.

"Numerous indications show that many other advances like this can be conquered by relying on our own efforts and conducting leadership and work organization properly to bring the enthusiasm and initiative of engineers, technicians, scientists and entrepreneurs into full play," Hu said.

"It is very difficult to design and build the blocks, whose processing require delicate precision," the paper said, "but the factory, with the advice from American experts, worked out the sample in a year and completed the whole 42 section magnet before national day."

The factory began reserach on the project two years ago.

/6662
CSO: 4010/5

ENVIRONMENTAL QUALITY

JAPANESE REPORT VIEWS CHINA'S POLLUTION, ENVIRONMENTAL PROTECTION

Tokyo NITCHU KEIZAI KYOKAI KAIHO in Japanese Aug 86 pp 34-40

[Written by Kazuo Hishida, director of the Hishida Environment and Resources Technology Comprehensive Research Institute]

[Text] With aspirations to modernize by promoting industrialization and regional development, China enacted the "PRC's Environmental Protection Law (provisional)" in 1979. In November 1980, China's Environmental Protection Control Agency invited the Japan-China Economic Association to send experts on atmospheric and water pollution problems to China. The topics pertaining to atmospheric pollution were: (1) control of industrial plants, enterprises, etc., (2) control of fuel to heat public institutions or for cooking at residences, (3) control of exhaust from transportation such as the railways, airways, motor vehicles, etc., (4) introduction of technologies to estimate and forecast atmospheric pollution over metropolitan cities, (5) technologies to prevent carbon dioxide and smog and (6) wind tunnel technology.

The topics pertaining to the prevention of water pollution were: management of water resource districts and (2) technologies to cycle and use industrial and domestic wastes. At that time, these topics were important issues for China's environmental authorities and even today, these issues have continued to be important.

During my employment with the Tokyo Metropolitan Government's Environmental Preservation Bureau, I was sent by the Japan-China Economic Association as an atmospheric pollution expert to such cities as Beijing, Shenyang, Anshan (Liaoning Province), Shanghai and Hangzhou where I exchanged technical information with concerned authorities, and I toured and held discussions at various plants, such as thermal power, petroleum, iron and steel, heavy and light industries, dyeing, foodstuffs, textiles, etc. At the request of friends made during this trip, I spent 3 days in April 1985 at the Qinghua University in Beijing and 2 days at the Nankai University in Tianjin, and my lectures centered on "The Present State of and Countermeasures on Environmental Pollution in Japan," "Energy and Atmospheric Pollution" and "Monitoring Systems, Generative Sources, Environment, Etc., of Atmospheric Pollution." My technical exchange relationship deepened further.

Then in May, in order to cooperate with China in the field of environmental preservation, Japan sent Yasuo Shoda, administrative vice minister of the

Environmental Agency, as head of a delegation consisting of seven Environmental Agency members and six observers. I participated in this delegation, again as an atmospheric pollution expert. This being the first exchange at the national level, Qu Geping, chief of the State Environmental Protection Bureau, headed the China delegation which consisted of seven bureau members and six observers. Opinions were vigorously exchanged on the present state of and issues on the environment, countermeasures for the various problems, etc., after which the two delegations agreed on (1) mutually sponsoring bureau-level conferences on a regular basis, (2) striving for personnel exchanges and personnel training, (3) fostering cooperation on research projects, and (4) promoting Japan-China exchanges on a private sector level. Later a courtesy call was made to Wang Zhen, honorary president of the Japan-China Friendship Association. President Wang declared: "China must establish a major plan on environment on a long-range basis."

Subsequently, the delegation visited Wuxi, Xuzhou, and Shanghai, and exchanged views to accomplish a technical interchange. This report on China's environmental pollution and the present state of its environmental preservation is based on my knowledge gained from these three visits to China and data from Chinese publications.

Sources Generating Environmental Problems

(1) Cultivatable Land and Economic Development

China's land area is about 9 million square km. It is the world's third largest country, ranking only behind the Soviet Union and Canada, and it is about 26 times the size of Japan, which has a land area of 370,000 square km. Its cultivatable land for industrial and agricultural production is said to be about 1.1 million square km(1), or only 12 percent of the entire country. Steppes, steep mountains and wilderness comprise about 60 percent, and deserts, like the cultivatable land, cover about 1.1 million square km of land area(2).

China has a population of about 1 billion people and in terms of cultivatable land, the density is 0.11 hectare per person (100 x 11 square meters) or only about twice the amount for a Japanese person.

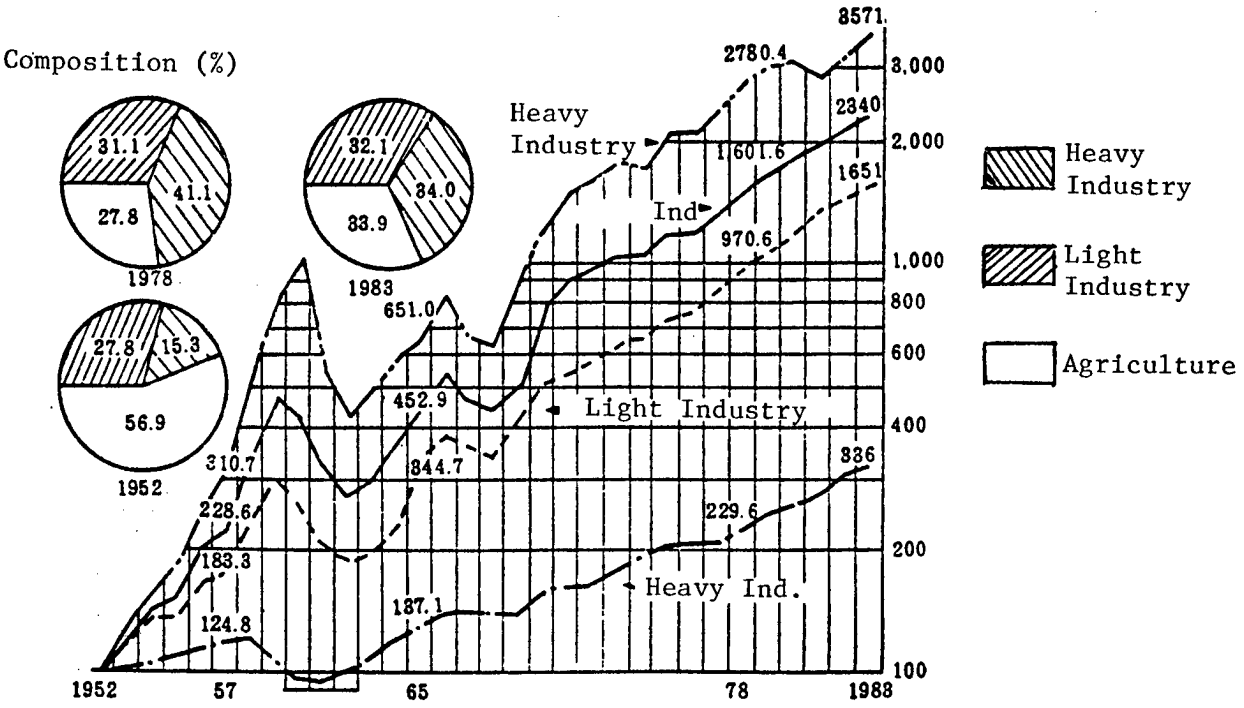
Meanwhile, the tempo of China's economic development has been rapid, and if 1952 is rated 100, then the remarkable increases in 1983 are reflected in the increase of the gross social productivity to 1,075 and the national income to 639. The sharp increases, particularly from 1970 on, resemble the period of high-level growth in Japan(3).

The growth and composition of industrial and agricultural productivity, which constitute the essence of the above phenomenon, are shown in Figure 1(4). If 1952 is rated 100, then in 1983, the industrial productivity increased to 2,340 and especially in the case of heavy industries of the multi-consumption type with crude fuel, to a remarkable high of 3,571. The latter figure is roughly 10 times the gross agricultural product of 336. Note that the vertical axis in the figure is indicated by logarithmic graph.

(2) Increase in Amount of Energy Production

The amount of energy production in China has increased remarkably. Whereas the amount in 1952 was 48.71 million tons (calculated on the basis of standard coal yielding 7,000 kilocalories per kilogram), in 1983, the amount increased to 713 million tons and a breakdown of the gross energy production indicated 71.2 percent of coal, 21.9 percent of petroleum, 2.4 percent of natural gas and 4.5 percent of hydroelectric power(5). Because China's fuel exports are almost 1 percent of coal and about 14 percent of petroleum, the bulk of its energy production is domestically consumed. Furthermore, 80 percent of its energy is consumed industrially(6).

Figure 1. Growth and Composition of Agricultural, Light, and Heavy Industrial Productivity (%)



China's energy consumption as against its gross national product of $100 million, when compared with the advanced nations, shows the consumption to be 1.7 times that of the Soviet Union, 2.1 times that of the United States and 5.6 times that of Japan, and from the standpoint of the utilization efficiency, China's experts say that China does not exceed 30 percent when compared to 57 percent in Japan and 51 percent in the United States. A comparison of China's heat efficiency with those of advanced industrial nations is shown in Table 1(7).

Therefore, the biggest sources of atmospheric pollution in China, which is dependent on coal for most of its energy, are carbon particulates from incomplete combustion (soot) or sulfur oxides which are generated during the combustion of fuel containing sulfur.

Table 1. Comparison of Heat Efficiency

	China	Advanced industrial country
Thermoelectric power plant	29%	35% - 40%
Industrial boiler	55% - 60%	80%
Industrial furnace	20% - 30%	50% - 60%
Home oven	15% - 20%	50% - 60%
Locomotive	6% - 8% (Steam)	25% (Diesel and electric)

The State of Environmental Pollution

Qu Geping stated: "Up until 10 or so years ago, China's general public showed hardly any interest in environmental pollution. At that time, the sky was blue, the air fresh, the rivers clean, the streets quiet, everything was green, birds chirped, flowers bloomed, the liivng environment was excellent; the Chinese people were satisfied and friends from abroad praised China's environment as clean and sanitary. Since then, after the upheaval of the 10-year cultural revolution, China's environment became polluted and the environmental pollution that affected foreign countries in the 1950's also appeared in China."

(1) Atmospheric Pollution

When coal is used as the principal fuel, the atmospheric pollutants are dust (fall dust and floating particulate matter), sulfur oxides (SO_2 and SO_3), nitrous oxides (NO and NO_2), hydrocarbons (HC), etc. Recently, motor vehicle exhaust fumes have become an issue in the major cities of China and the addition of carbon monoxide (CO) to the above pollutants has resulted in the formation of secondary pollutants, such as photochemical oxidants.

The State of Pollution in Representative Cities

The state of atmospheric pollution in the representative cities[9] of China is shown on Table 2.

These values will be compared with the results measured during the state of atmospheric pollution in 1983 over the 23 wards of Tokyo when pollution was conspicuous. In China's case, the extent will be based on the daily average value, whereas it will be the annual average value for Tokyo. Generally, statistics will show that 2 to 2.5 times the average annual value will become the maximum concentration for the daily average value. The following is based on these comparisons.

Floating particulates were 2 to 5 times that of Tokyo, when the situation was the same for 1968 and 1969.

Table 2. The State of Atmospheric Pollution in Representative Cities (compared with results measured in 1983 from 23 wards of Tokyo)

Pollutant	Average concentration and daily average value in the atmosphere	Annual average value of Tokyo
Floating particulate matter (SS)	0.24∿0.915 [mg/m^3] (Cities in no. area)	0.05 (mg/m^3]
(SS)	0.19∿0.095 " (Cities in so. area)	
SO_2	0.18∿0.39 " (0.063∿0.13ppm)	0.011 [ppm]
CO	3∿12 ∿ (2.4∿9.6ppm)	0.9 [ppm]
NOx	0.04∿0.22 ∿ (0.028∿0.16ppm)	0.031 [ppm]
O_3	0.06∿0.21 (0.03∿0.10ppm)	0.021 [ppm]
Pb	0.10∿0.60 [μg/m^3] (Average cities	0.15 [μg/m^3]
Pb	0.24∿4.99 " (Cities with heavy traffic)	
Fall dust	30∿70 [t/km^2·Month (Heavily affected cities)	4[t/km^2·Month]

Sulfur dioxide (SO_2) was 3 to 6 times that of Tokyo, when the situation was more conspicuous in 1967 and 1968.

Carbon monoxide (CO) was 2 to 5 times that of Tokyo when the situation was the same for 1965 to 1967.

Nitrous oxide (NO_x) pollution was over 4 times that of Tokyo, and a high concentration of 0.16 ppm has never been measured in Tokyo.

Ozone (O_3) was 1.5 to 5 times that of Tokyo, the same state in 1969 and 1970 when photochemical smog was generated to cause serious damage, affecting over 10,000 people throughout the nation.

Lead (Pb) in the average city was about twice that of Tokyo, and in cities with heavy transportation, 10 to 15 times that of Tokyo. The situation was the same for 1975, prior to which unleaded gasoline had not been used.

Fall dust was 5 to 17 times that of Tokyo and there was never a time when the amount of 30 tons per square km in a month was exceeded in Tokyo. Along with its high level growth in 1960, Japan was at a point where pollution was most conspicuous at the representative cities. In the 1960's, fall dust, which became the index of atmospheric pollution in Japan, exceeded 100 tons per square km per month in some areas, and several hundred to 1,000 tons per square km per month were measured in some areas of a certain industrial region. It has been reported that factories and offices were closed down because of the excessive amount of dust(8).

Fall dust is black smoke that can be seen with the naked eye. A deposit gauge is placed outdoors for a month so that the amount of fall dust accumulated can be measured. Besides soot and metallic oxides which result from combustion, sand particles, such as yellow sand, are also measured. Generally speaking, it is hard to imagine 1,000 tons of dust settling in a 1-square-km area, and my interpretation is that sand and other matter were included.

Besides this sort of dust that is visible to the naked eye, there are other dust forms less than 10 micrometers in size, invisible to the naked eye, they remain floating in the atmosphere and never settle on the ground. These are called floating particulate matter. Because this dust remains floating for long periods in the atmosphere, its inhalation, along with other contaiminants like sulfur dioxide, and penetration into the lung sacs can be injurious to human health, causing respiratory illnesses, etc.

In 1979, a U.S. environmental survey team measured floating particulate matter over four metropolitan cities--Beijing, Shanghai, Wuhan, and Guangzhou--during the winter season, the results of which are shown on Table 3(9). A comparison with the present state of Tokyo of 0.05 mg per cubic meter (50 micrograms per cubic meter) revealed that these four metropolitan cities are areas plagued with the serious problem of atmospheric pollution.

Table 3. Concentration of Floating Particulate Matter Over Four Metropolitan Cities During the Heating Season

Name of City	Floating Particulate Con. 1-hr value
Beijing	80∿160 [$\mu g/m^3$]
Shanghai	150∿200 "
Wuhan	170∿400 "
Guangzhou	190 "

The State of Atmospheric Pollution in Inland Areas

Located in a basin in northern China, Lanzhou (Gansu Province) and Erenhot (Inner Mongolia Autonomous Region) are industrial cities where topographically subsidence temperature inversions are apt to occur in winter. Because the inversion layer acts like a cover to compress the upward diffusion of atmospheric pollutants, the cities are choked by pollutants and covered by smog, causing the daytime to be darkened like night and cars must be operated with their lights on.

In addition to China's coal combustion type of pollution, Lanzhou and Erenhot are subjected to petroleum combinat-type pollution. Besides the smog in winter, there are times when photochemical smog pollution occurs with the generation of secondary pollutants from nitrous oxides and hydrocarbons in summer when ultraviolet rays are more intense.

(2) Water Pollution

China's water resources are comparatively plentiful. The volume of surface water flowing throughout the nation is $26 \times 10^{12} m^3$ per annum, ranking China as the sixth in the world. However, a computation by population shows only $2.7 \times 10^3 m^3$ per person, and so China's ranking is much lower than many countries of the world. Precipitation is concentrated in the summer months, and because rainfall occurs mostly south of the Chang Jiang, many areas are affected by drought.

The pollution of rivers, lakes, marshes and sea areas increased along with the growth of industries and the increase in population.

In 1979, China's displacement was 300 x $10^8 m^3$ per annum (82 x $10^8 m^3$ per day). Out of the total of 1,100 water areas, including rivers, lakes and marshes, 850 water areas (77 percent) are polluted and even from the latter number, 230 water areas are heavily polluted (9). In particular, 80 percent of the latter are affected by industrially polluted water, and because only 20 percent of this volume is processed, the medium and small rivers near cities have been transformed into displacement rivers(10).

Because about 40 million tons of polluted water from the industries and households are drained into the Huangpu Jiang, which is said to be the source of drinking water for Shanghai, in summer the river becomes smelly and black, and the water quality is extremely bad. Formerly, the condition of water turning so polluted occurred about 20 days during the year, but after 1981, this condition rose from 130 to 150 days during the year(10).

The biochemical oxygen demand (BOD) of the Xuzhou River, which flows under the Garden Bridge, a Shanghai landmark, is 30 ppm and its dissolved oxygen count is 0(11), which means that the water is totally devoid of oxygen and that the river is "dead," since fish cannot survive in it. The river is in a worse state than the Sumida River in Tokyo during 1962 and 1963 when preparations were underway for the 1964 Olympic Games. At that time, an unusual water shortage continued, the water supply was dropping and preparations for the sewage system were delayed, and as a result, the Sumida River emitted a foul odor. The Xuzhou River is in a similar condition.

It is said that a good number of Shanghai residents filter their tap water at the faucet. Among some of the cities which use river water for both drinking and industrial use, the deterioration of the water has caused factories to cease operating, and in some cases they moved elsewhere in search of water resources. The amounts of freshwater fish caught in China have been as follows: 600,000 tons annually in the 1950's; 400,000 tons annually in the 1960's; and a drop to 300,000 tons annually in the 1970's(8). There is a direct relationship between pollution from factory drainage and the drop in the catch of freshwater fish.

The state of the pollution of surface water by harmful matter is described as follows:

Phenol and cyanogen are found in underground water throughout China, and in large amounts particularly in Shanxi, Hebei and Shandong provinces and the southern part of the northeast.

Mercury is scattered throughout the country, but amounts exceeding the standard level are found in the northern part of the northeast and in the southwest.

Arsenic is found in the Huang He in amounts exceeding the standard level in the rivers and sea near Tianjin. The soil in Hebei Province has a high arsenic content.

The level of chrome is not comparatively high in the water, but pollution from it has been detected in Shenyang, Tangshan, and Jinan. A great deal of chrome has been detected in the surface water of industrial cities.

(3) Acid Rain[12]

Acid rain refers to precipitation (including rain, snow, hail, and mist) whose pH value is less than 5.6. Generally speaking, rainwater has a pH value of about 6 or 7, but it becomes minimally acidic when carbon dioxide in the atmosphere dissolves in the precipitation.

According to the numerical values of more than 2,400 reports obtained during the survey conducted by China in 1981, throughout the 23 provinces, 121 cities and the autonomous regions, it is reported that China's pollution by acid rain (referred to as the "airborne devil" by the general populace) is increasingly worsening as a regional environmental pollution problem.

The numerical values obtained from measurements in the 23 provinces, cities and autonomous regions showed that, with the exception of Jilin, Gansu, and Ningxia provinces, acid rain was found in 20 provinces, cities, and autonomous regions, or in 87 percent of the country. Of the monitoring stations participating in the survey, 55 stations, or 45.5 percent of the total, detected acid rain, and out of a total of 2,407 samplings taken, acid rain appeared in 1,071, or 44.5 percent of the total. On the basis of these numerical values, it may be said that acid rain pollution in China is not a peculiar phenomenon that is limited to specific cities, but that it is a serious problem affecting the entire country.

Distribution of Acid Rain

The frequency of acid rain occurring in the various provinces, cities and autonomous regions, divided into five stages on the basis of the proportionate size of the sampling frequency, and the ratio of the total number of monitoring stations in the various areas, classified into two divisions, are depicted in Table 4. As a result, the reports from all the various parts of the 23 provinces, cities and autonomous districts showed that 52 percent of the entire country accounted for acid rain with Class III frequency of occurrence or over.

A look at the geographical distribution by district zoning on the occurrence of acid rain shows that it is concentrated primarily in the southwest, central south and the east, shows an ever-increasing trend. Of the three regions, the southwest is most conspicuous with pollution, followed by the central south and east.

In contrast, the northern district is not heavily affected by acid rain, and it seems to be distributed principally in areas south of the Chang Jiang.

Numerical values of acidic rain surveyed in China's cities are shown in Table 5. According to the average pH values during precipitation, the cities (excluding Qingdao) with less than 5.6 pH are located predominantly south of the Chang Jiang and cities with less than 4 pH are all located south of the Chang Jiang.

Table 4. Classification and Breakdown of Acid Rain in the 23 Provinces, Cities and Autonomous Districts

Category									Category					
I(0~6%)			II(7~13%)			III(14~19%)			IV(20~40%)			V(>40%)		
Name of Providence, City or Autonomous Regions	A (%)	B (%)	Name of Providence, City or Autonomous Regions	A (%)	B (%)	Name of Providence, City or Autonomous Regions	A (%)	B (%)	Name of Providence, City or Autonomous Regions	A (%)	B (%)	Name of Providence, City or Autonomous Regions	A (%)	B (%)
Beijing	4	-	Tianjin	7	25	Shanghai	14	-	Henan	20	50	Fujian	40	78
Hebei	4	7	Shanxi	7	8.5	Jiangsu	14	27	Jiangxi	36	79.5	Guangxi	56	87.5
Jilin	0	0	Inner Mongolia	11	30.0	Anhui	19	31.5	Guangdong	39	65	Guizhou	83	100
Heilong-jiang	2	20	Liaoning	7	38.5				Sichuan	30	45	Yunnan	43	100
Gansu	0	0	Shandong	11	19.5							Qinghai	83	100
Ningxia	0	0												

Note: 1) Beijing measurements were taken in second half of 1979 and first half of 1980; Shanghai measurements from 1980 to 1981

2) A= Frequency of occurrence of acid rain from all samplings in the provinces, cities and autonomous regions

B= Frequency of occurrence of acid rain from samplings taken in cities in the provinces, cities and autonomous regions in question.

Table 5. Numerical Values of Acid Rain Measured in China's Cities

Name of city	Measuring period	Minimum value	Maximum value	Average value	Frequency of occurrence of acid rain
Beijing	End of 1979 to early 1980	5.28	8.80	7.05	4
Tianjin	82.6-7	4.8	7.5	6.9	7
Shenyang	82.5	7.3	9.5	7.8	0
	8	3.6	8.6	6.3	16
Dalian	82.5	6.9	7.8	7.2	0
	8	7.0	7.3	7.2	0
Shanghai	80-81	4.02	7.40		14
Nanjing	82.2-6	6.4	7.7	7.0	0
Xuzhou	82.5-7	3.8	7.0	5.3	66.7
Zhangzhou	82.5-7	4.5	6.4	5.1	83.3
Fuzhou	82.5	4.8	6.5	5.4	66.7
Xiamen	82.5	5.5	6.4	5.9	25
Nanchang	82.5	3.7	5.7	4.7	87.5
	8	4.2	6.0	4.8	85.7
Qingdao	82.5	5.3	5.3	5.3	100
	8	4.7	5.1	5.0	100
Guangzhou	82.5	3.8	7.3	5.6	55.6
	8	4.6	6.7	5.5	67
Nanning	82.5	4.1	7.2	5.9	55
	8	4.1	7.4	6.0	24
Guilin	82.5	4.2	6.4	4.9	78
	6	4.4	4.5	4.5	67.5
Chongqing	82.5-7	3.6		4.3	
Guiyang	82.5	3.7	6.5	4.8	81
	8	4.0	6.3	4.6	90
Duyun	82.5	3.1	5.3	4.3	100
	8	3.2	5.4	4.2	100
Lanzhou	82.5-7	7.2	8.2	7.7	0
	8	7.4	7.5	7.5	0
Xining	82.5	5.0	5.5	5.3	100
	8	5.5	6.0	5.6	75

The cities whose minimum pH values were less than 4.0 included Xuzhou and Guangzhou (3.8), Nanchang and Guiyang (3.7), Chongqing (3.6) and Duyun (3.1) in Guizhou Province. Particularly in Guizhou Province, acid rain was detected at the monitoring stations in all the cities, districts and autonomous regions, and the province was most conspicuous of the nation's 23 provinces, cities and autonomous regions with its average pH value of 5.0 on precipitation throughout the province and a minimum value of 3.1.

In 1981, the average pH value of precipitation in Chongqing was 4.6 and a minimum value of 3.0, but in 1982, conditions worsened and by summer the average pH value had increased to 4.3.

It is believed that the origin of acid rain in China is attributed principally to sulfur oxides.

According to a 1981 report from China, the amount of discharge of sulfur oxides (SO_2 and SO_3) from coal fuel ranged from 14 million tons to 18 million tons per annum. The amount discharged in Japan is 1 million tons per annum. With the release of about 14 to 18 times more sulfur oxide than in Japan, on a cultivatable area which is only about twice that of Japan in terms of per person, the amount of damage inflicted per person in China, when compared to a Japanese, is 7 to 9 times greater.

The same thing can be said for the conspicuous concentration of environmental pollution from sulfides and dust, besides acid rain. Coal produced in China has a sulfur content of 0.3 to 5 percent, and some exceeds 5 percent. This high sulfur-containing coal is found widely in China and even today it is plentiful, especially in the southwest where the coal has the highest sulfur content--an average value of 3.23 percent--and is plentiful. The greater part of this sulfur content in combustion results in sulfur oxides.

(4) Other Environmental Pollution Factors

There are many other types of environmental pollution besides atmospheric and water pollution which occur in the metropolitan areas or in industrial regions. Annually, 400 million tons of industrial waste matter are discharged in China and the degree of its integrated use is small. Ash from coal combustion totals more than 1 billion tons[8] which is left in huge piles that occupy a great deal of land, and because of the casual dumping, the elements have drained away or scattered the ash to pollute rivers and the environment.

The forests in China occupy an area of about 1.2 million square km, or 12 percent of the country's land area, but reckless deforestation has caused a decrease in forest resources. The consumption of forest resources has reached 200 million cubic meters annually of which two-thirds is attributed to unplanned, reckless deforestation. Forest destruction has caused soil erosion from an area totalling 1.5 million square km, has caused 2.6 billion tons of silt and sand to be deposited in the Huang He and Chang Jiang, resulting in the loss of 6 million [mu] (400,000 hectares) of rich garden topsoil.

In the past 15 years, grassland has turned into desert covering an area of 27,000 square km, and grasslands in the north and south has been reduced to 770 million [mu] (510,000 square km).

Furthermore, noise and vibration pollution ahve occurred in the metropolitan cities with the increase in factory production and increase in the number of vehicles servicing the transportation network. Noise pollution of the cities of Beijing, Shanghai, Tianjin, Nanjing, Hangzhou, Wuhan, Guangzhou, Chongqing, Harbin, etc., reached more than 80 decibels. Today, the noise has been reduced with the enforcement of horn regulations.

Countermeasures for Environmental Preservation

The enactment of the "Environmental Protection Law" in 1979 and the steady implementation of legislation led to the establishment of environmental standards. The State Council's Environmental Protection Control Agency, which was established in 1974, was integrated with four offices of other state organs to form the Ministry of Urban and Rural Reconstruction and Environmental Protection in 1982 with the purpose of strongly unifying the administration of environmental protection throughout China. In 1985, it was renamed as the State Environmental Protection Bureau and remains in operation today.

The State Environmental Protection Bureau has control over the China Environmental Science Research Institute, China Environmental Science Academy, China Environmental Inspection General Station, China Environmental Protection Industrial Association, Environmental Protection Cadre School and even the environmental science departments of universities.

Furthermore, in 1982, the "Oceanographic Environmental Law" and the "Forestry Law" were enacted, and in 1984 the "Water Pollution Prevention Law" was enacted. The following legislation was successively enacted for the purpose of targeting the discharges of all enterprises: In 1982, the atmosphere-related environment standards, the urban environmental noise standards and seawater standards; in 1983, surface water environmental standards, the technical principles and methods for the standards on the discharge of atmospheric pollutants, standards on dust discharged from boilers and exhaust gas standards on vehicular exhaust pollutants and measuring methods; and in 1984, regulations and standards on pollutants in farm dirt, standards on the safe use of agricultural chemicals and standards on the discharge of industrial pollutants.

The objectives of the State Environmental Pollution Bureau are:

(1) To control with a comprehensive program and lay a rational plan.
(2) To control present-day factory pollution.
(3) To execute strict control over new pollution.
(4) To establish regulations on urban and rural factories.
(5) To comprehend manufacturing facilities in factories.
(6) To build healthy cities through proper maintenance of factories.

The State Environmental Pollution Bureau is charged with the important task of implementing countermeasures with which to realize the concrete fulfillment of the objectives.

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Nuclear Techniques

THICKNESS MEASUREMENTS OF MAGNETIC LAYER ON ALUMINUM DISC PACKS BY ENERGY DISPERSIVE X-RAY FLUORESCENCE ANALYSIS

Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese No 9, Sep 86 pp 1-4, 56

[English abstract of article by Wang Yuzheng [3769 5940 2398], et al., of Shanghai Institute of Nuclear Research, Chinese Academy of Sciences]

[Text] This paper describes the thickness determination of the magnetic layer on aluminum disc packs using ^{238}Pu excited fluorescent X-rays of Fe. The method is rapid, non-destructive and highly precise. The measurement principle, detection device design, elimination of interference factors and data treatment are discussed. The range of thickness measurement is 0.5 - 15 μm. The precision of the thickness measurement is better than 5 percent when the coating thickness is greater than 1 μm.

LARGE LIQUID SCINTILLATION COUNTER FOR FAST NEUTRON CAPTURE CROSS SECTION MEASUREMENTS

Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese No 9, Sep 86 pp 5-8, 56

[English abstract of article by Xu Haishan [1776 3189 3790], et al., of the Institute of Nuclear Science and Technology, Sichuan University]

[Text] For determining fast neutron radiative capture cross sections, a new capture gamma-ray counter of approximately 4π geometry has been developed. The counter is spherical with a diameter of 1 meter, and with a liquid scintillator volume of 680 liters. The tank is shielded by lead, 10 cm thick, and Li-paraffin, 40 cm thick. A coincidence method is used for reducing background due to neutron capture by the hydrogen in the liquid scintillator. The counter has been successfully used for measuring the neutron capture cross sections of Au-197, Ta-181 and Tm-169 on a 2.5 MeV pulsed Van de Graaf accelerator.

SPUTTERING OF DILUTE Si(Co, Ta) ALLOY WITH 20-80 keV Ar^+ IONS

Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese No 9, Sep 86 pp 9-11, 56-57

[English abstract of article by Wang Zhenxia [3769 7201 6667], et al., of Shanghai Institute of Nuclear Research, Chinese Academy of Sciences; and Zhou Zuyao [0719 4371 1031] of Shanghai Institute of Metallurgical Research, Chinese Academy of Sciences]

[Text] The study of alloy and compound sputtering is very important in applications of material sputtering phenomena and in the theory of atomic collision. The surface layer compositional change of the sample under sputtering is an interesting sputtering phenomenon. In order to observe this phenomenon and study its characteristics, the authors selected the ternary alloy system Si(Co, Ta). The samples were sputtered individually with 20-80 keV Ar^+ ions. Then a study was made of how the large compositional change of the surface was dependent on the energy of the Ar^+ ions.

ANALYSIS OF ION OPTICAL CHARACTERISTICS OF CYCLOTRON BEAM TRANSPORT SYSTEM

Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese No 9, Sep 86 pp 15-17, 57-58

[English abstract of article by Ding Dapei [0002 1129 3099] of the Institute of Nuclear Science and Technology, Sichuan University; and Mao Naifeng [5403 0035 0023] of the Institute of Atomic Energy, Chinese Academy of Sciences]

[Text] A program, TRANSPORT, has been used to calculate and analyze the ion optical characteristics of the cyclotron beam transport system in Sichuan University. The results show that: 1) the calculations agree with the performance in practice under the parameters operating now in this cyclotron; and 2) if the geometric parameters are changed, the field parameters will need to be adjusted moderately, the size of the beam envelope in all lines will decrease, the beam intensity reaching the targets will increase and the beam spot property on the targets will improve.

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